

# **HO Turnout Review**

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## HO Turnout Overview

Any HO modeler would easily be driven mad researching HO turnouts on the internet. Opinions and experiences vary such that it would be rational to conclude that there are no workable HO turnouts to be had with a reasonable cost and a reasonable quality. Such is not the case. I have extensive experience (over 30 years) with a number of HO switch manufacturers such as BK Enterprises, Shinohara, Walthers / Shinohara, PECO, Micro Engineering (ME), and Atlas. Suffice it to say that all the above manufacturers make HO turnouts that perform well with most HO engines and rolling stock. It is also true that all turnouts can have occasional quality problems (e.g. kinks, out of gauge, etc.) which manufacturers or suppliers usually replace free-of-charge. I will not be discussing Fast Tracks, Proto88, Railway Engineering, Tillig Elite, Roco, Bachman's E-Z track, Atlas True-Track, Kato Uni-Trak, or Central Valley Works.

A good overview by Rick Kolm is on the net although the article does not mention Shinohara turnouts. Allan Gartner's "Wiring for DCC" web site is a "go to" authority for wiring turnouts and Mark Gurries web site is a font of turnout information. Unfortunately, most manufacturer's web sites are largely product listings with little or no information, with PECO being perhaps the most informative site, and Shinohara the worst (since they have no English web site). Many readers may find all the information they wish to know from Rick Kolm's overview, Mark Gurries website, and Allan Gartner's website. Having done so you should be familiar with turnout terminology (point rails, closure rails, throw-bars, stock rails, frog rails, frog, insulfrog, electrofrog, power routing, etc (see Illustration 1 below) and I will assume that is so in this document. You may also have learned all that you wish to know about turnouts, but if not, read on. You may be surprised.

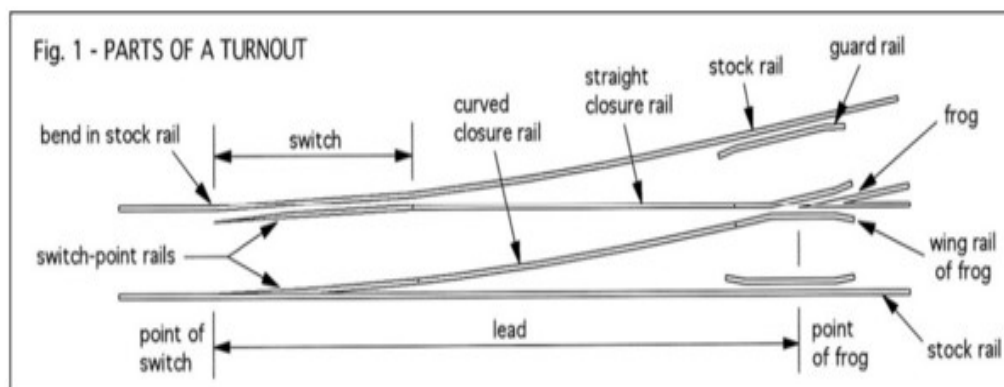


Illustration 1: Parts of a Turnout-Rick Kolm-Pacific Coast NMRA

Today's HO rail is made from “nickel-silver” or, as sometimes called, “white brass”. Wikipedia defines Nickel-Silver as follows:

***Nickel silver, Mailechort, German silver, Argentan, new silver, nickel brass, alбата, alpacca, or electrum is a copper alloy with nickel and often zinc. The usual formulation is 60% copper (Cu), 20% nickel(Ni) and 20% zinc. Nickel silver is named for its silvery appearance, but it contains no elemental silver unless plated.***

Nickel-silver, as defined above, is castable, extrudable, solderable, and has good-enough corrosion resistance, conductivity, and surface contact resistance, making it an excellent material for model railroad trackage. At the above composition the material is a “single-phase material” and appears homogeneous. If zinc (Zn) content gets above 30-32% the materials becomes a two-phase material and appears “speckled” to the observer. Other than appearance, there is no significant physical property degradation at the 30ish per cent Zn level. As Zn content increases above 40% the material cannot be cold-extruded and would be unsuitable for rail fabrication for that reason alone. HO rails are cold extruded to shape and have a generally grayish white or silvery appearance. My X-Ray (XRF) fluorescence analyses show that most, not all, extruded rail segments are a nickel-silver wrought alloy with Ni content averaging 20% - Zn content averaging 15-20% with the bulk of the remaining composition Cu at 50-55%.

HO turnout metal frogs are either bent-rail types (PECO, Shinohara, and B-K) or cast (Atlas and Micro-Engineering (ME)). Atlas uses a high Zn (98.8%+) die casting alloy for all Custom-Line turnout frogs save for the original Custom-Line phenolic or plastic frogs. Originally, Atlas points were brass (as were the stock, closure, and frog rails) and were probably cast and stamped. Early on Atlas switched Custom-Line and Snap Switch point rails to a die-cast Zn. Today's Mark IV Code 100 Atlas turnouts utilize nickel silver points and Atlas Code 83 turnouts have always utilized nickel silver points. Micro-Engineering does it own in-house die casting and they use a 61%Cu, 22%Zn, 8.32% Mn (Manganese), 4.56% Ni, 2% Pb(lead) alloy for their frogs. The relatively high Mn content is mostly for grain size refinement. All other Micro-Engineering rails are nickel-silver. Shinohara, PECO, and B-K Enterprises utilize a bent rail frog design using wrought nickel-silver. Shinohara's one piece closure-frog wing rail assembly and their point rails are an extruded C97300 die casting alloy (Cu 63%, Ni 18%, Zn 16%). PECO bent-rail frog segments are also close to a C97300 alloy (Cu 15%, Ni 12%, Zn 18%, Fe 11%). PECO's point rails are somewhat different (Cu 45%, Ni 17%, Zn 17%, Fe 9%, Ti 5.33%, Bismuth (Bi) 1.5%). B-K Enterprises one piece frog -closure rail- point rail assembly is an extruded Cu 44%, Lead (Pb) 20%, Zn 14%, Tin (Sn) 12%, Ni (11%) alloy.

## Unsolderable Frogs

Internet commentaries abound about “unsolderable” cast frogs from Atlas and Micro Engineering. But there are also commentaries to the contrary...a confusing situation to say the least. Atlas escapes the controversy by providing a tab (or tabs) for a screw and recommends soldering to the screw. Micro Engineering is silent on the matter. No one questions the solderability of the nickel-silver rail components.

My personal experience has been that I can quite easily solder to all turnout components, castable or extruded, zinc or nickel-silver, from any of the manufacturers with a 15W soldering pencil, a resin flux, a non-resin cored 0.020” eutectic tin-lead solder, and a sharp edged screwdriver (preferably with a nickel plated tip). My procedure is as follows:

1. Gouge the surface with a flat bladed screwdriver.
2. apply a spot of resin flux.
3. Press a tinned solder pencil wedge tip to the gouged surface
4. feed a thin diameter (0.020”) eutectic tin-lead solder wire to gouge area.
5. Solder tinned 30 gauge wire to solder bead

I use the same above technique to solder jumper wires between point and closure rails and between closure rails and stock rails (when appropriate). It is my belief that the thin diameter solder wire is probably critical to the process because it limits heat loss through the solder wire and helps direct the heat into the joint area. I believe it is also critical to use a thin bladed or pointed solder tip for the same reason.

I believe 30 gauge wire is more than adequate for these connections because the current rating (which is very conservative) for 30 gauge wire is 0.860 amperes continuous and the application will rarely exceed 0.860 amperes, and never continuously. Furthermore, jumper wires are relatively short and well heat-sinked by the solder bead and the underlying frog or rail segment. In the future, I plan to use 32 gauge wire which is rated at 0.53 amperes continuous because it is somewhat less visible than the 30 gauge wire. But frankly, the normal adult will not notice 30 gauge rail jumpers from distances more than 2 feet or so. See Illustrations [2-5](#) below.

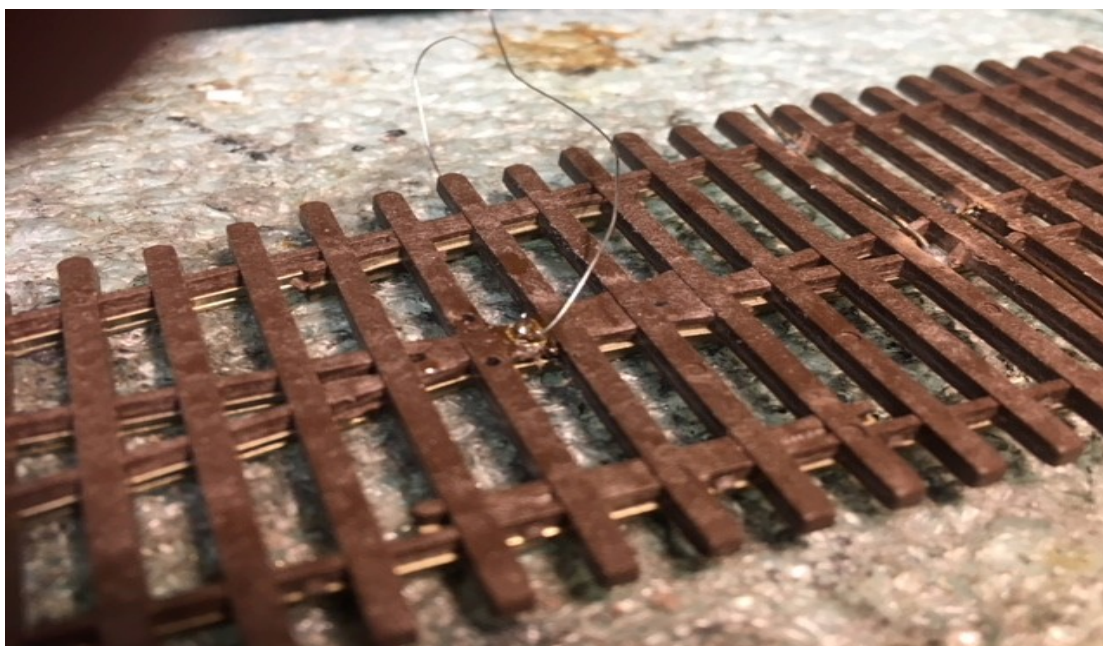


**Illustration 2: 30 Gauge wire soldered to Atlas Zinc die-cast frog**

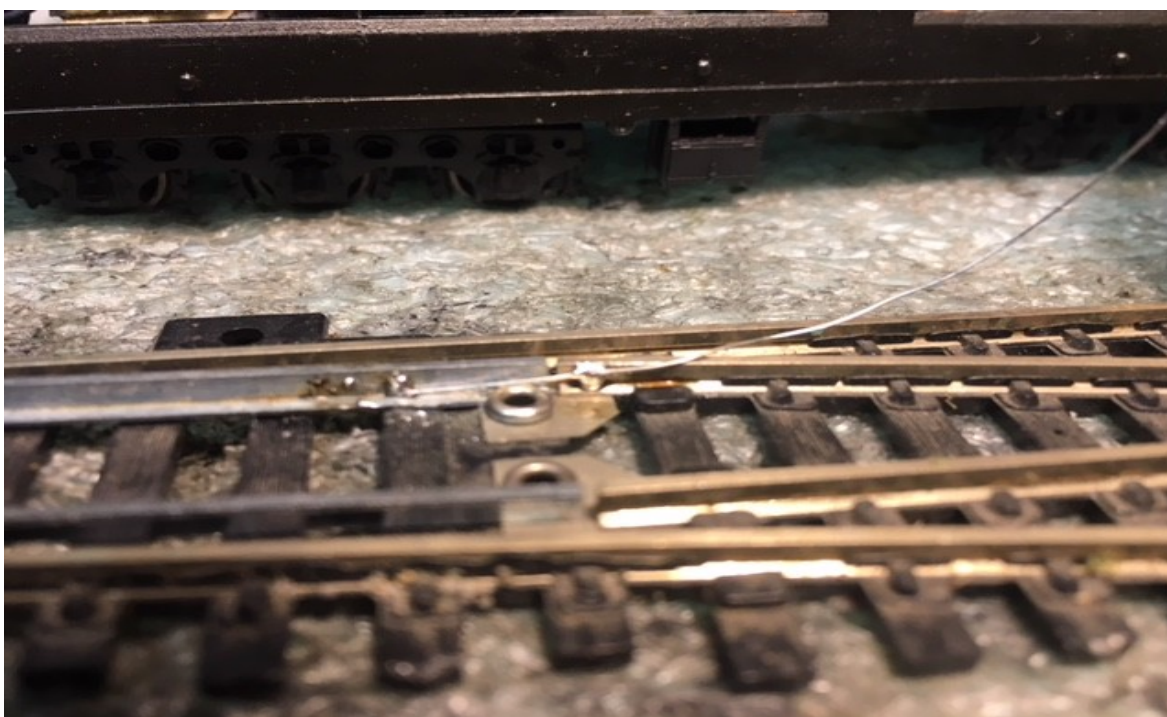


**Illustration 3: Solder Connection to Micro-Engineering Frog Web**





**Illustration 4: Solder Connection to Micro-Engineering Frog Sprue**



**Illustration 5: Point-Closure Rail 30 Gauge Jumper -Atlas Custom-Line**

## PECO Overview

PECO is an English firm that makes high quality turnouts that are a bit pricey. Most of their products, except for the code 83 turnouts, have tie spacings to European standards but are otherwise built to NMRA RP25 standards. All PECO turnouts are by definition DCC friendly and the throwbars have a retention spring that allows the user to “finger-throw” the throwbar and get a positive retention on the point-stock rail interface without the need for a switch machine or hand throw. My own club (Olde Newburgh Model RR Club) has a majority bias for insulfrog PECO turnouts and they do install easily, work well, and look reasonably good (IMHO). As soon as you lay them down they are ready to go...no wiring or switch machines necessary. They are readily available at a little over \$20 per turnout and sometimes at a little under \$20 per.

PECO frogs are of the bent rail variety with a plastic frog “floor”. PECO point rails are nickel-silver rail stock. This choice of materials makes it easy to solder jumper wires to the PECO turnouts. There are wiring instructions available on the PECO website in case you are not familiar with Allan Gartner's “WiringforDCC” website. PECO is the only manufacturer currently making both Insulfrog and Electrofrog versions of their turnouts. In fact, Insulfrog is a PECO trademark name and none of the other manufacturer's utilize this term in their literature. At this point in time, PECO is the only manufacturer of Electrofrog turnouts. The gap-to-gap distance for an Insulfrog PECO #8 frog is 1.06” and for a small radius turnout the gap is approximately 0.70”. Medium radius turnouts have frog gap lengths from 0.75-0.95”. Other PECO turnout dimensions are towards the middle of the NMRA specifications.

While PECO turnouts are well engineered and very popular they are not perfect. Their Insulfrog turnouts have a tendency to “frog short” with certain locomotives...in particular with long wheel base steam engines, or older engines with wide flanges. The fault occurs at the apex of the frog rails where the divergent frog rails are closely spaced. A wheel that bridges this very narrow gap will “frog short” because with the Insulfrog wiring scheme the divergent frog rails are always at a different “polarity”. A quick fix is to coat the surfaces of the divergent frog rails at the apex with a thin insulative coating such as nail polish. A longer term fix is to grind away the nickel-silver rail on the inside of the V-shaped frog apex and fill the resulting gap with an epoxy like JB weld. This “frog short” design defect has not been a show stopper for PECO as many modelers and clubs will use nothing else, but it does annoy some (like me) and PECO does not seem to be in any hurry to modify their design (which would be very easy) to eliminate the

problem. I will mention that other manufacturer's Insulfrog turnouts do NOT have this (exact) problem as they take greater care with their frog rail apex spacings...nuff said.

### **My PECO wish list**

1. Get rid of the frog shorts...get rid of the frog shorts....get rid of.....
2. Produce a line of US #4-#6-#8-#10 turnouts and a #6 3-way. (good luck to me)
3. Produce double crossovers in HO C100, C83, and C70 (American standards)
4. Produce some #5 yard ladders in HO C100, C83, and C70 (American standards)

### **Atlas**

Atlas is a New Jersey based company that has been making HO turnouts/track since at least 1950 (see Illustration 6 below). Their 1950 switch and track ties were fiber and the rails were brass. The 1953 Atlas advertisement (see Illustration 7 below) was identical to the 1950 advertisement. There was no information on the frog material, the point rail material, or the wiring schema . Furthermore, I have never seen, nor known anyone who has seen, the double crossover/single crossover/and ladder-track assemblies as shown in the 1950-53 advertisements. There was a snap-track turnout in the 1950-53 advertisements with a plastic frog and ties that looks near identical to the current Atlas snap-switch designs except that it was then only offered in brass. It appears to me that the regular Atlas frog was a bent rail design (similar to the ca. 1939-1955 Mantua switch design) and that there were no built-in gaps.

Around 1955 Atlas introduced what appears to me to be a phenolic resin frog with riveted point-closure rail connections and riveted point-throwbar connections..the marketing name was Custom-Line. These phenolic frogs were probably (my supposition...not confirmed) made by saturating a paper substrate with phenolic resin and pressing with heat to shape (see Illustration 8 below). Of course, the phenolic resin frog is electrically dead and that presents a potential problem to short wheel-base locomotives. However, I have run my Mantua A5 0-4-0 at crawl speeds through these phenolic frogs with no problems. At some point in time Atlas mixed color (black) into the plastic...and these “blackened” plastic frogs may have been injection molded (see Figure 9-11 below) . The “phenolic / plastic” frog technology was probably identical to the plastic frogs used in the Atlas snap switch design still in production today.



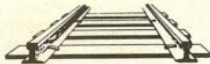
## railroads and equipment



14

# ATLAS

From the Collection of  
"Hoseeker"



**HO GAUGE TRACKAGE.** Brass rail mounted on flexible fibre tie strip. Can be curved to fit any radius.

Track Section, 3 ft.	.75
Fibre Tie Strip, 25 ft.	1.50
Fibre Tie Strip, double track, 10 ft.	2.50
Fibre Switch Tie Strip, 10 ft.	2.00
Brass Rail, 99 ft.	3.75
Steel Rail, 99 ft.	2.75
Rail Joiners, gross package	.50
Rail Joiners, Plastic, 3 gross display	5.40
Track Section, "S" Gauge, 3 ft.	1.20



**HO CROSSOVERS.** Single and double crossovers of brass on fibre tie strips.

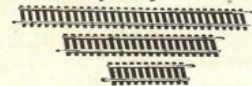
Single #6 right hand	3.95
Single #6 left hand	3.95
Double #6	11.95



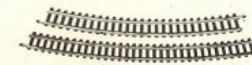
**HO 3-SWITCH LADDER.** For use in yards and industrial districts. Three switches mounted on strip of the stock. Available in #4 right or left hand. Each 5.95

## SNAP-TRACK

**HO SNAP-TRACK.** Brass rail mounted on molded plastic tie strip. Sections snap together for portable layouts. Numbers in parenthesis indicate number of pieces to radius, standard package.



Straight section, 9 inches (12)	.25
1/2 Straight Section (12)—for use with HO 90° Crossing.	.25
3/4 Straight Section (12)—for use with HO 90° Crossing.	.25



Curved section, 15" radius (12)	.25
Curved section, 18" radius (12)	.25
Curved 1/2 Section, 15" radius	.25
Curved 1/2 Section, 18" radius	.25

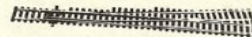


Bumper Track Section	.39
Snap Track Layout Book	.10
3-Conductor Hook-Up Wire, 25 ft.	1.25

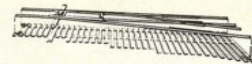


**HO CROSSING.** Molded plastic base with brass rail.

18° crossing	2.50	60° crossing	2.25
30° crossing	2.50	90° crossing	1.75
45° crossing	2.25		



**HO SWITCHES, ASSEMBLED.** Brass rail on plastic tie strip. Ready to use. Available in #4, 6 and 8, right and left hand, and wye. Each 1.95



**HO SWITCHES, KITS.** Brass rail and plastic tie strip, easy to assemble. Available in #4, 6 and 8 and wye. Each 1.25

**CORK ROADBED.** Pressed cork provides quiet running and realistic appearance. HO roadbed consists of two strips, each bevelled on one side, laid side by side.

**HO Roadbed** (2 36" strips) .35  
Switchblocks, #4, 6, 8 and wye, each .35  
Liner for "S" Gauge (fits between two HO strips) pkg. of 25 3.75



Manual Switch, RH	2.25
Manual Switch, LH	2.25
Electric Switch, RH	4.50
Includes Push Button Switch	
Electric Switch, LH	4.50
Includes Push Button Switch	
Switch Control Box	.60
For use with double solenoid switch machines	



**HO Girder Bridge—**with built-in track 1.75



**HO 90° Crossing** 2.25



**Terminal section** .75

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Illustration 6: 1950 Atlas Advertisement-courtesy of Hoseeker.net



# ATLAS Takes the WORK Out of TRACKWORK

From the Collection of  
"Contributed Anonymously"

**They're Completely Assembled  
READY-TO-USE**

Completely Assembled  
**DOUBLE CROSSOVER**  
\$11.95

or ...  
if you choose to  
make your own  
**DOUBLE CROSSOVER**  
... it's easy when you  
use Atlas #6 Switch Kits  
and an 18° Crossing  
(Full Instructions Included).

Completely Assembled  
**HO SWITCH KITS** \$1.25  
Wye, 4, 6 and 8 (R.H. or L.H.)

Completely Assembled  
**3 SWITCH LADDER** \$5.95  
Nos. 3 or 4 (R.H. or L.H.)

Completely Assembled  
**HO SWITCHES** \$1.95  
Wye, 3, 4, 6 and 8 (R.H. or L.H.)

**NOW ... MORE HOURS OF  
OPERATING FUN**  
with these time-saving  
money-saving ATLAS products

(R.H. or L.H.)  
No. 6

Completely Assembled  
**SINGLE CROSSOVER**  
\$3.95

Completely Assembled  
**CROSSINGS**

90°	\$1.75
60°	\$2.25
45°	\$2.25
30°	\$2.50
18°	\$2.50

**Other Famous  
ATLAS HO  
Products**

**CURVABLE HO TRACK**  
3 foot section  
**75¢**

12 Doz.  
**50¢**

Famous Atlas  
**RAIL JOINERS**

Heavy-Duty Fibre  
**TIE STRIP**  
\$1.50  
25 Ft.

**\$2.50**  
10 Ft.

Heavy-Duty Fibre  
**DOUBLE TIE STRIP**

Heavy-Duty Fibre  
**SWITCH TIE STRIP**  
**\$2.00**  
10 Ft.

Plastic Insulating  
**RAIL JOINERS**  
**15¢ Doz.**

**#ATLAS TOOL COMPANY INC.**  
HILLSIDE, NEW JERSEY

SEE THESE FAMOUS ATLAS PRODUCTS AT YOUR FAVORITE HOBBY SHOP OR DEPARTMENT STORE

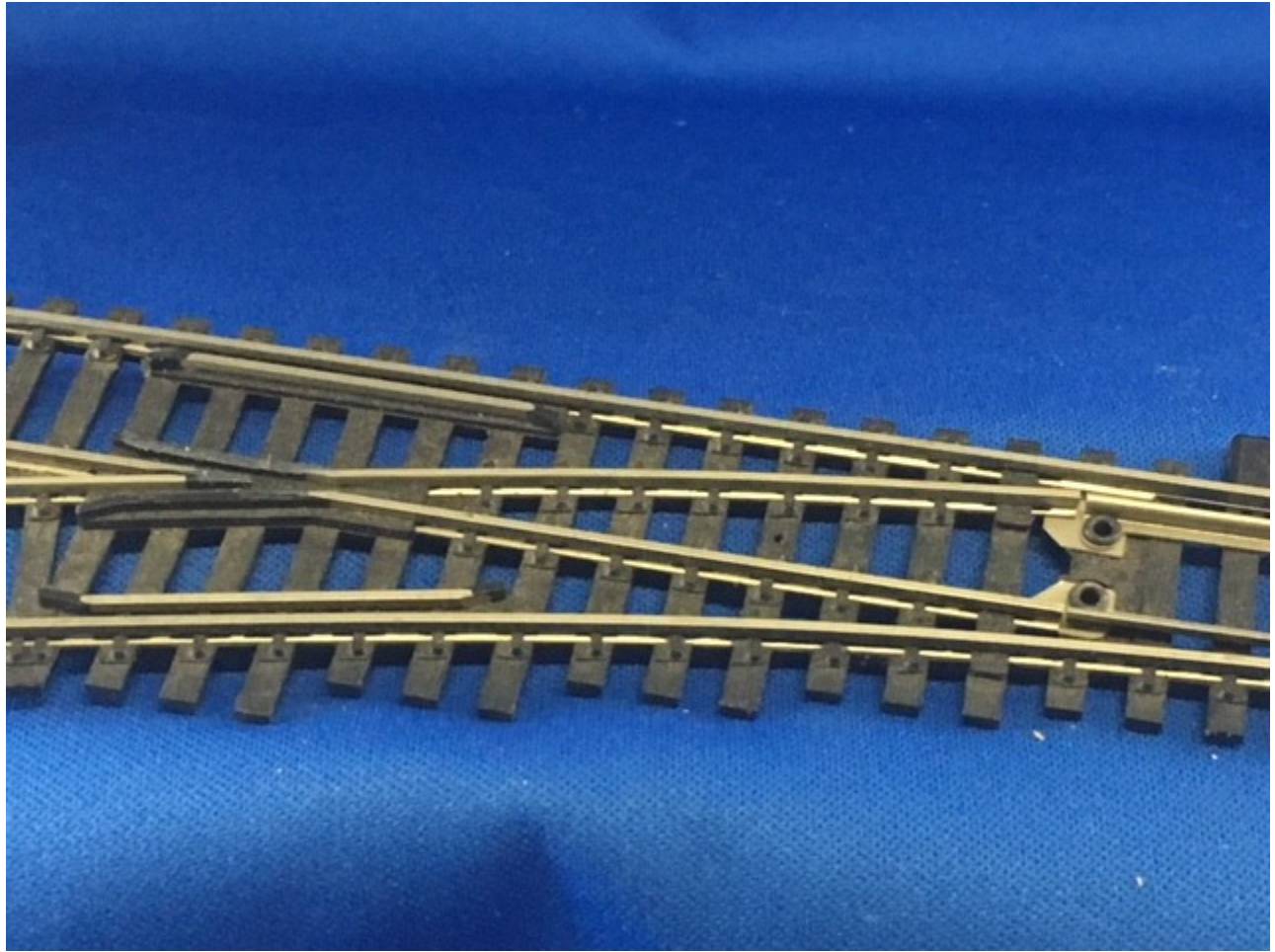
Illustration 7: 1953 Atlas Track Brochure-ref. Hoseeker.net





**Illustration 8: Atlas Custom-Line (1) with Phenolic Frog**

This particular turnout in Illustration 8 (above) was purchased ca. 1980 and has been in continuous operation since that time. Note that there are no “tabs” on either side of the frog as there are in later model metal frog Custom-Line turnouts (Mark 2, 3, and 4).



**Illustration 9: Atlas Custom-Line (1) "Blackened" Plastic Frog**

In the above Illustration 9 the plastic frog has been blackened by adding color to the plastic. This frog may have been injection molded. Note the guard rails which appear to be nickel silver rail segments with plastic tips. Later Custom-Line turnouts Code 100 (Mark 2, 3, and 4) utilized molded plastic guard rails. The closure rail-point riveted connection is clearly evident in Illustration 9 and this riveted design was continued up through the Mark 3 Code 100 Custom-Line design.



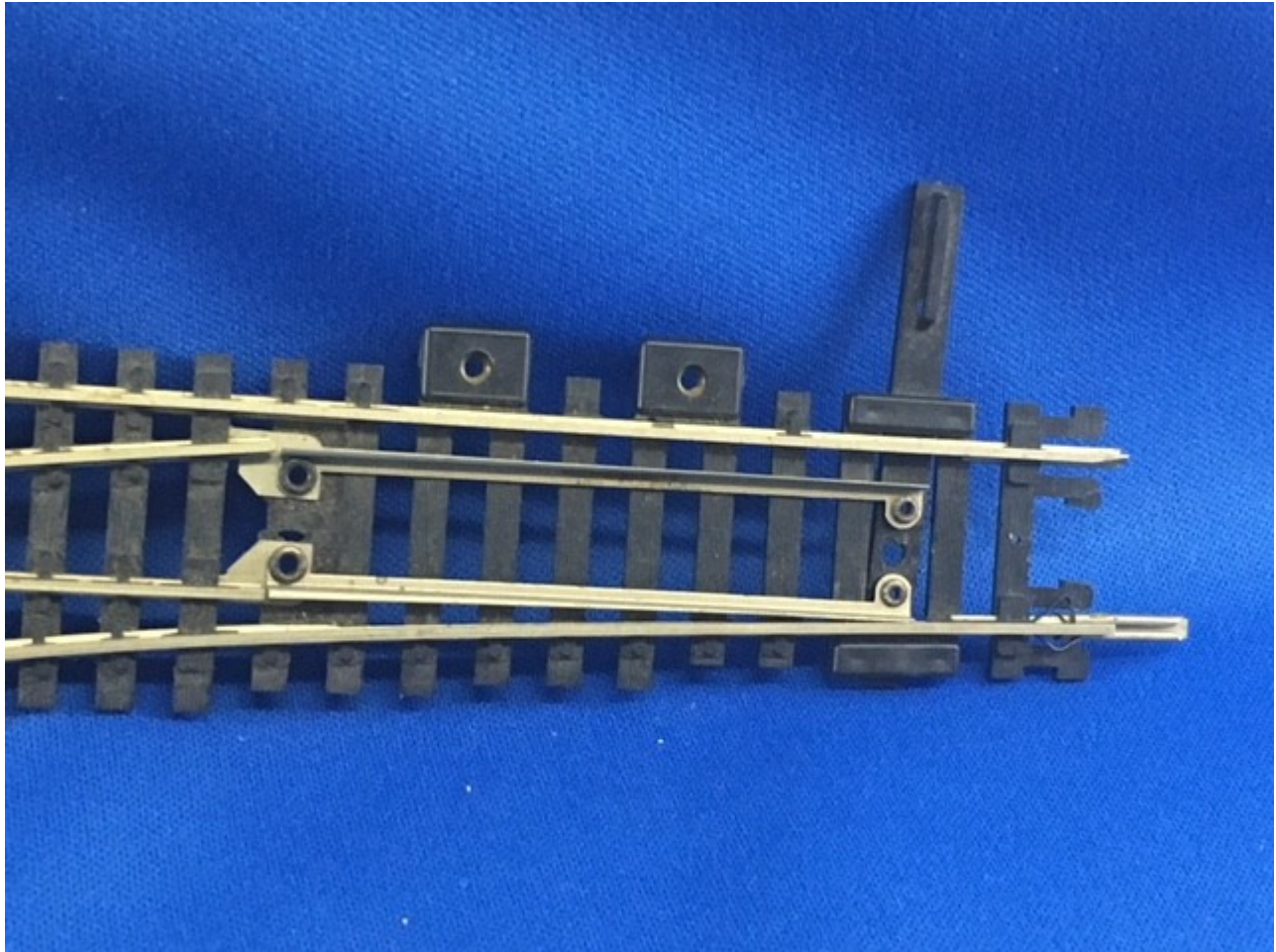
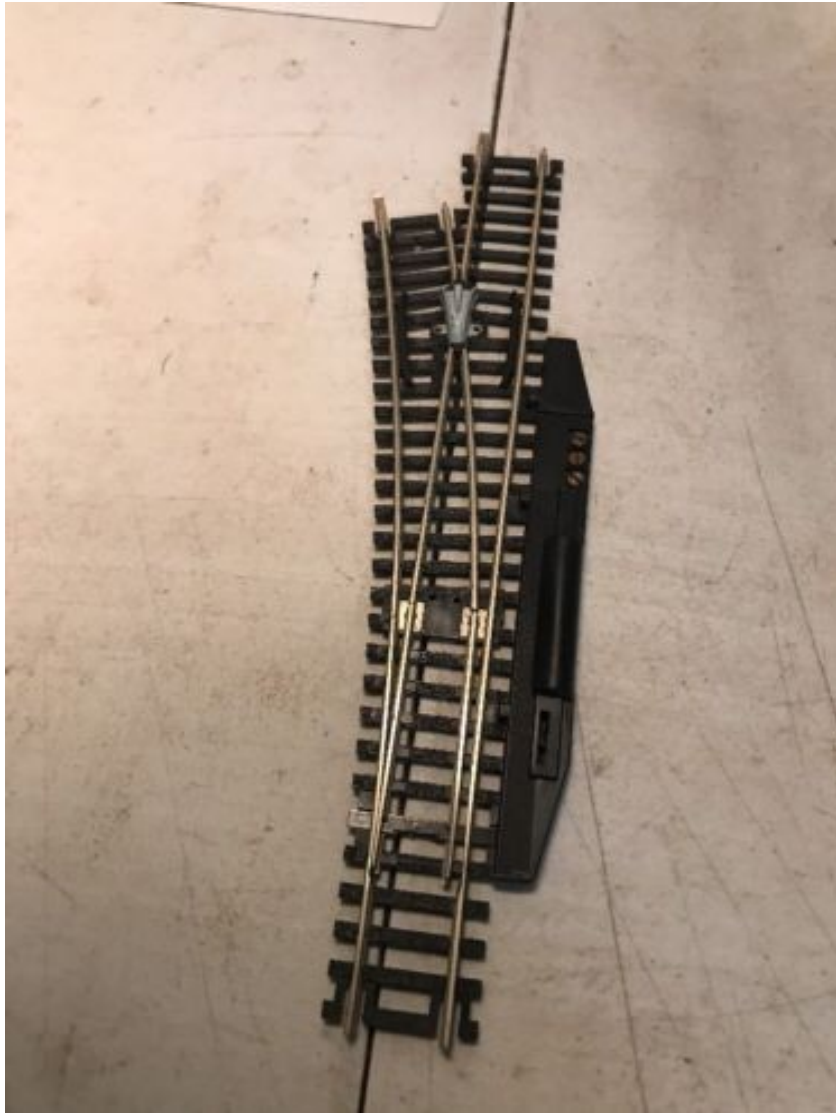


Illustration 10: The Custom-Line (1) Riveted Point Assembly

For the Custom-Line (1) HO turnouts all the point connections were riveted. Note the two switch machine tabs molded into the assembly. The point material for the Custom-Line 1 HO turnouts were stamped zinc. These Custom-Line (1) turnouts with the phenolic and/or plastic frogs were available with either brass or nickel-silver rail segments.

In 1980 Atlas released an Atlas Custom-Line Supreme (see Figure 11 below). The Supreme had a switch machine with a current cut-off when the throwbar reached the limit of its movement. The idea was to prevent switch motor burnout due to holding down the button that activated the motor. This “Supreme” variant was withdrawn from the market in 1992. This Custom-Line Supreme design appears to have been the first Atlas HO turnout to have a metal (die-cast Zinc) frog and it also appears to have modified the riveted connections (more on this later).





**Illustration 11: Atlas Custom-Line Supreme**

In 1983 Atlas introduced their Mark 2 Custom-Line turnouts with a die cast zinc frog and “extruded” points (see Figure 12 below). The frog was uncoated and had built-in tabs protruding to the side. These tabs were there to take a 1-72 screw which could be soldered to. The points were a cast zinc extruded to its final shape (a first for Atlas). The point-closure rail connection was still a riveted assembly as was the point rail-throwbar connection. These Mark 2 Custom-Line turnouts were available with either brass or nickel-silver rail. The plastic switch motor tabs are still molded into the tie strip assembly.



**Illustration 12: A Mark 2 Atlas Custom-Line Turnout**

In 1992 Roco announced a code 83 line of HO turnouts and one year later Atlas announced their code 83 which appear to be identical to the 1992 Roco's. Atlas code 83 turnouts had a much more refined tie and tie plate design than the code 100 turnouts but the basic design was similar. Illustration 13 (below) shows the Atlas code 83 “Super-Track” turnout which has a longer divergent rail than the normal Atlas Custom-Line design. The super variant was only offered in a #6 turnout in code 83. The riveted point rail connections have been eliminated, and the point rail-closure rail attachment for the code 83 Atlas turnouts is a stapled plate arrangement. The point rail throwbar attachment utilizes the “clip type” throwbar. These 1993 code 83 enhancements would not be implemented into the Custom-Line code 100 turnouts until the Custom-Line Mark IV release in 2009.



**Illustration 13: An Atlas "Super-Track" code 83 Turnout**

In 1992-3 Atlas released a Custom-Line code 100 Mark 3 design with brass or nickel-silver rail and a “blackened” zinc die-cast frog. The switch machine tabs are much reduced in size giving a much cleaner and realistic appearance. The guard rails are molded plastic instead of a metal rail segment with plastic tips. The points are connected with the clip-type throwbar but rivets are still used for the point-closure rail connection.



**Illustration 14: Atlas Custom-Line Mark 3 HO Turnout**



In 2009 (or thereabouts) Atlas introduced its Mark IV Custom-Line turnouts in nickel-silver rail only for both C83 and C100. The riveted point rail-closure rail connection was eliminated for the C100 turnouts and the point rails appear to be nickel-silver instead of the cast and extruded zinc. The Mark IV frogs are still blackened die-cast Zinc and the guard rails are molded plastic, but the point rails have been converted to a stamped nickel-silver similar to the point rails used in the C83 Custom-Line turnouts...amazingly this major design enhancement was never advertised by Atlas.



**Illustration 15: Atlas Custom-Line Mark IV C100 HO Turnout**



One exception to the Custom-Line design progression are the Custom-Line Mark IV WYE turnouts which still have the molded on switch motor mounting tabs (see Illustration 16 below).



**Illustration 16: Atlas Custom-Line Mark IV WYE-C100**

### **Atlas Turnout “Tweaks”**

Custom-Line MarkII, MarkIII, and MarkIV turnouts feature one or two tabs co-cast with the frog which permit a wire to be soldered to the frog. Atlas will provide screws and nickel silver buses to facilitate soldering to this tab, but it is possible to solder directly to the tab by just scraping off the blackened coating (see Illustration 3 below). Frog solderability has been issue with Atlas turnouts, but I find it to be doable (see previous section on soldering die-cast frogs).

Some find it beneficial to file the frog casting to the same level as the closure and frog rails to prevent “wheel bump-up”. But, just as an FYI note, our club has literally dozens of older generation Atlas Custom-Line switches that have been operating satisfactorily for over 30 years without any file dressing. Atlas frog lengths (between the gaps) range from 0.95-1.150” which may pose problems for some short wheel-base locomotives such as 4-4-0s, 4-4-2s, and 0-4-0s. However, I (and others) have run my Bachman 40 ton diesels through Custom-Line (1), 2, and 3 turnouts without any problem.

A common complaint re Atlas turnouts is that the rivet attachment between the point and closure rails can loosen over time causing electrical continuity problems. A jumper wire between the point rail and the closure rail easily solves this problem and this can be done with the turnout installed and ballasted (see Illustration 6 above). My club has operated over two dozen Atlas turnouts (Gen I and Gen II Custom-Lines) for over 30 years with very few electrical continuity problems at the point-closure rail junction.

Some have found that the Atlas points are too close together and that some switch machines cannot adequately press the point rail to the stock rail. One solution is to spread apart the points using small styrene shims (see Appendix). This complaint has also been common with Shinohara turnouts. My solution is to use another switch machine. My club has dozens of Atlas turnouts with Caboose Hobbies ground throws and they operate without any point-to-stock rail contact problem.

Internet commentaries indicate that some Mark IV Custom-Line turnouts have a quality problem with the closure rails having a “hump”. This can be fixed by cutting some of the molded plastic “connections” between the molded tie...easier done before installation than after.

### **My Atlas wish list**

1. A center-over spring for point retention to the stock rails
2. Better tie plate detail
3. Improved quality control...especially on the #8 C83 turnouts (see appendix)

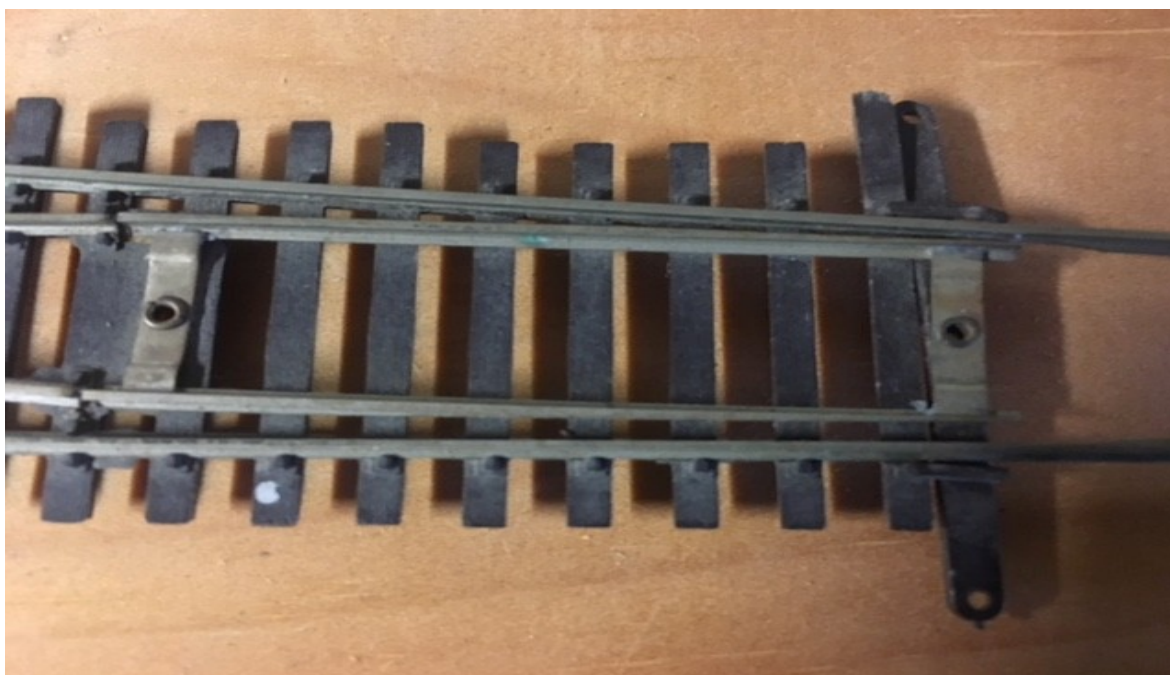
### **Shinohara**

Shinohara has been making HO turnouts since at least the 1960s and probably much longer. They have absolutely no company documentation, no website, and no presence on HOSEEKER.com. All they do is make the most complete line of HO turnouts in the business, put them in boxes, and ship them wherever. I have personal experience with Shinohara C70, C83, and C100 equipment and have found them to be a high quality product. My club runs Shinohara C100 three-ways, and double crossovers in DCC mode (by definition the turnouts are NOT DCC friendly) w/o issue...albeit we do a few enhancements on the three-way (jumper wires) and the double-crossovers (see my review article on Allan Gartner's website<sup>1</sup>). I have no personal experience with curved turnouts and I believe that the often reported DCC shorting issues on these curved turnouts are due to the relatively tight radii relative to the straight-through #6 and #8 turnouts which I am personally familiar with.

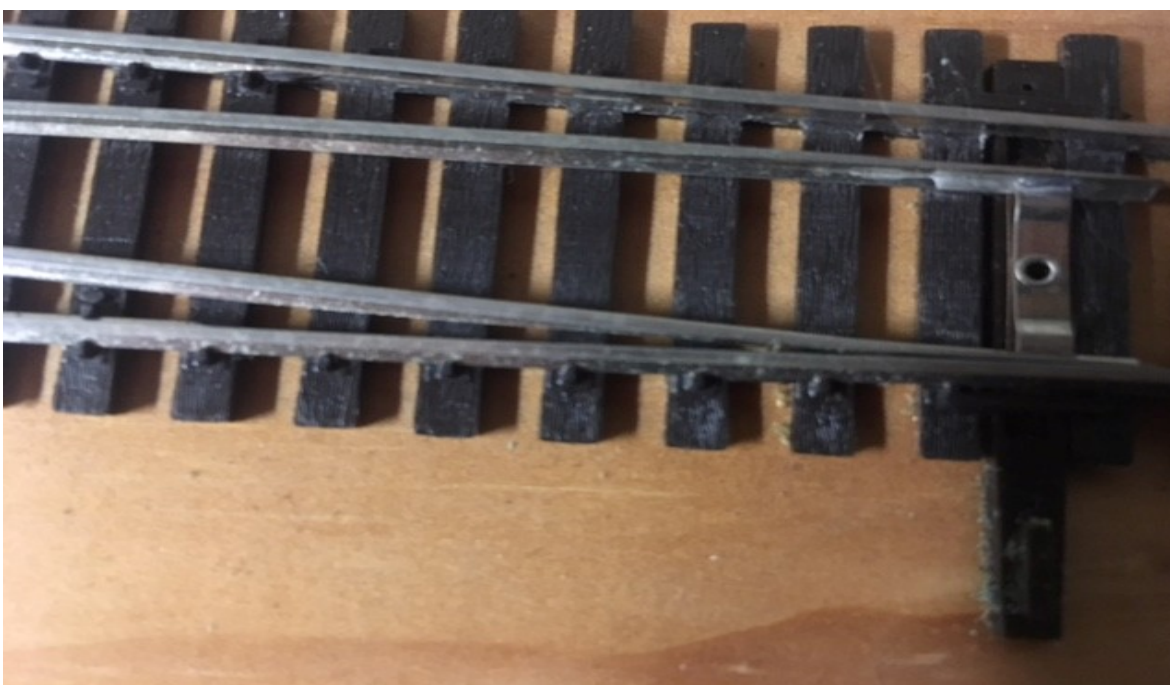
There appear to be at least 4 generations of Shinohara HO turnouts. All generations utilize bent-rail frogs (no castings anywhere) with all rail construction throughout. The first generation are what I call “double-crossbar” turnouts in brass (Illustration 17-below). The second generation substituted nickel-silver rail for the brass but retained the double-crossbar feature. What I call the 3rd generation Shinohara turnouts are “single-crossbar” turnouts which have a curved point rail resulting in a much smoother transition at the point-closure rail junction (see Illustration 18-below). Shinohara has produced their turnouts in C70, C83, and C100 turnouts.

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1 [http://www.wiringfordcc.com/wirefordcc\\_toc.htm](http://www.wiringfordcc.com/wirefordcc_toc.htm)



**Illustration 17: Shinohara 1st Generation Double Crossbar Design**



**Illustration 18: Shinohara 3rd Generation Single Crossbar Design**



Shinohara Generation 1-3 turnouts are not by design DCC friendly due to the metal crossbars, but I can attest that they work just fine with DCC. Generation 3 Shinoharas have a single-crossbar design with curved point rails permitting a more gradual transition from the straight-through to the divergent route.

A fourth generation Shinohara product are the Code 83 Walthers-Shinohara DCC friendly turnouts. The wiring connections for the Code 83 Walthers-Shinohara turnouts are mini bus-bars soldered to the underside of the rails and then molded or pressed into the tie strips. Shinohara used to manufacture double-crossbar non-DCC friendly C83 turnouts and these are still available on the internet.

Generations 1-3 (Double and single crossbar) Shinohara turnouts have bent rail frog assemblies consisting of one-piece closure/frog wing rails with a plastic frog “floor”. The divergent frog rails are a one piece V-shaped assembly and there are no built-in rail gaps. Wiring schemes are detailed on Allan Gartner's “WiringforDCC” web site. It is possible to operate single or double-crossbar Shinoharas without switching power by using the point-to-stock rail contact/s as a switch. Power is routed across the frog. Our club routinely runs DCC with Shinohara double-crossbars, three-ways, and double-slip turnouts using point-stock rail contact switching...it works. **AND THE BEST THING ABOUT POINT-STOCK RAIL CONTACT SWITCHING IS THAT THERE IS NO DEAD RAIL...THE FROGS ARE POWERED AND W/O THE NEED FOR GAPS.** I know there will be concerns re point-stock rail switching and especially so about potentially damaging the point rails due to currents above 5 amperes. If that is a concern just current limit that part of the track-work with circuit breakers or automobile bulbs. And it is a cheap and quick way to get “running”.

Aside from a smattering of the usual gauge issues, a commonly heard complaint re the double-crossbar Shinohara turnouts is shorting when the backside of a wheel bridges the gap between the point rail and the adjacent stock rail. Usually, the shorting involves 80” passenger car, long wheel-base steam engines, and anything on a curved turnout. The minimum gap I have found on the double-crossbar turnouts was 0.148” and that was at the point rail-closure rail junction. It seems unlikely to me that a wheel flange that should be no more than 0.030 would ever bridge a gap that, at a minimum, was 0.148” (which, by the way, is over the NMRA specification).

Having just said that stock rail-closure rail shorting should never occur it seems that on occasion what should not happen does happen. Now what?



Firstly, check the track and the offending wheels against the NMRA specifications. If not okay...replace the offending wheel. If okay, go to secondly.

Secondly, paint the backside of the offending wheel with an insulation paint (e.g. finger nail polish or, better yet, JB weld. If that doesn't work, go to thirdly.

Thirdly, consider insulating the point rail at the point where the shorting occurs. Some creativity may be called for with this approach. Some modelers have been successful by epoxying a thin strip of styrene to the closure rail. Evergreen sells 0.005" white styrene sheet stock from which thin strips can be easily cut to fit the sides of the closure rail at the shorting location. Evergreen also sells pre-cut strips of 0.010" white styrene which would also be useful. I would recommend first trying to coat the offending closure rail location with black nail polish and see if that resolves the problem. At best, black nail polish is a temporary solution as it will rather quickly wear away. But then I would mix up some JB weld two-part epoxy and use that in place of the nail polish. JB weld is really tough and will not easily wear away. Do not JB weld the closure rail to the ties or you will have a turnout replacement job forthwith.

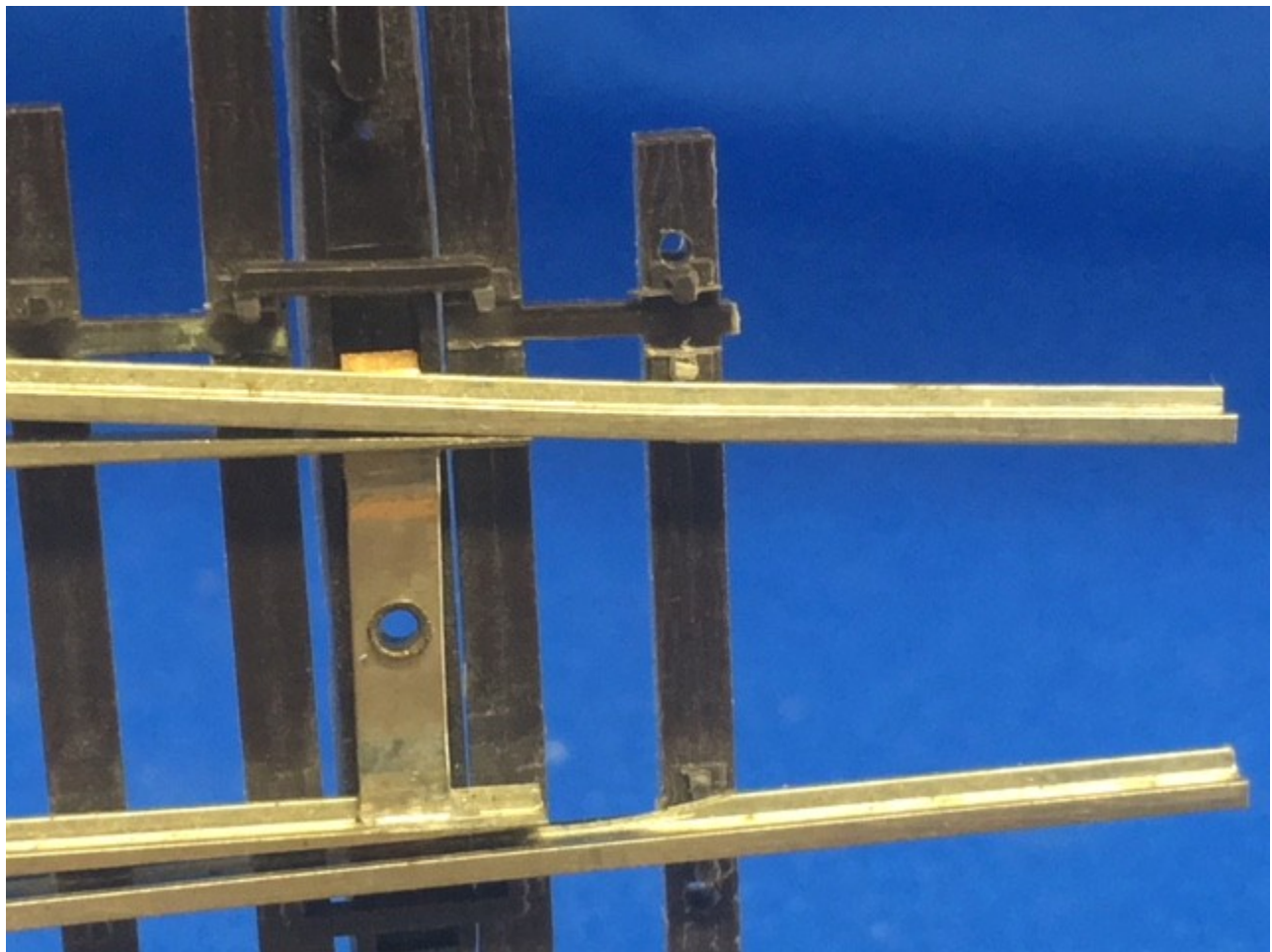
**Cutting gaps in rail stock**-Since Shinohara single or double-crossbar turnouts may require gapping if you do not choose to utilize the above wiring scheme. I will list three rail gapping procedures that I have personally used.

1. Dremel Tool-the Dremel tool cutting wheel is 0.035" thick. Using the right angle drill attachment will make the cut more vertical than is the case when drilling w/o the attachment.
2. Zona Saws-the Zona saw blade is approximately 4.5 inches long and will cut a gap 0.010" wide. The saw can be awkward to use when cutting installed turnouts due to the proximity of adjacent rails.

Filling the gaps is optional. I usually insert a styrene strip and epoxy it in place. Then I trim the styrene to the rail profile as closely as possible. Sometimes I utilize JB weld to fill the space. Just be careful not to cut too deeply as you may sever the tie strip underneath the cut.

Soldering Shinohara frogs is never a problem due to the bent rail design...no zinc die casting alloys here.

An occasional Shinohara turnout problem involves the copper tab underneath the point rails (see Illustration 19 below). The tab is supposed to slide under the stock rails and enhance the electrical contact between the point and stock rails. On occasion it appears that these tabs do not “break contact” with the stock rail before the adjacent tab “makes contact” with its stock rail...ergo short. Of course, the newer Shinohara turnouts with the “split” throwbar will not be susceptible to this “make-break” problem. Please note that this is a rare event. Another rare fault event occurs when the tab gets damaged and 'bunches up' instead of sliding nicely under the stock rail.



**Illustration 19: Shinohara throwbar tab**

Converting Shinohara single or double-crossbar turnouts (see Illustrations x and xx below) to be by-definition DCC friendly requires that the metal crossbars be removed.

For the double cross-bar (first generation) Shinohara turnouts it is really necessary to do the conversion before installing and ballasting because it is necessary to cut away some ties around the point-closure rail junction to facilitate soldering and desoldering. Single crossbar Shinohara turnouts can easily be modified either before or after installation. There are a number of You-Tube videos that show how to go about doing these conversions so I will not deal with that in this document.

### **My Shinohara wish list**

1. Ruggedize the C83 turnouts...the “crossbar” connections are fragile.
2. Add a point retention spring.
3. Re-engineer your curved turnouts to be (more) DCC friendly.

Note: Recently (1Q 2018) Shinohara has announced on their Japanese language websites that the owners are retiring and closing down their business. There are rumors that Walther's is getting involved to preserve their extensive business in Walthers-Shinohara C83 trackage. Stay tuned.

### **Micro Engineering (ME)**

Micro Engineering (ME) is a Missouri based father-son company manufacturing what are widely considered to be the best looking HO track/turnouts available. Current production consists of C83 (#5 and #6) and C70 (#6 only) turnouts which are (by definition) DCC friendly. These turnouts are Insulfrogs (as defined by PECO) and the frogs are “isolated” by gaps. There is a center-over spring permitting “finger switching” with good point-stock rail electrical contact. The guard rails and frogs are cast metal (a nickel-silver variant with 5-10% Manganese) with bolt-head and clamp details molded in. An access hole is provided underneath the frog to allow soldering to the bottom of the frog casting (actually, it's the frog sprue). The cast #6 frog is 1.35” between the gaps which is considerably longer than the gap-to-gap distance on PECO or Atlas turnouts and much longer than the spacing between drive wheel centers for steam engines. The rails are nickel-silver alloy C752 (62%Cu – 18%Ni – 17%Zn).

Because of the long frog, modelers will often find it necessary to power the frog which will require soldering a wire to the frog. Most internet commentaries will state that the ME frog is very difficult to solder. My experience is the contrary, as I find it easy to solder to the ME frog (see Illustrations 3 and 4 above).

ME would (IMHO) win most turnout beauty contests and they have an excellent reputation re customer interaction.

### **My ME wish list**

1. Code 100 turnouts and track
2. A double – crossover; slip switches; curved turnouts

### **BK Enterprises (AKA Trout Creek Engineering)**

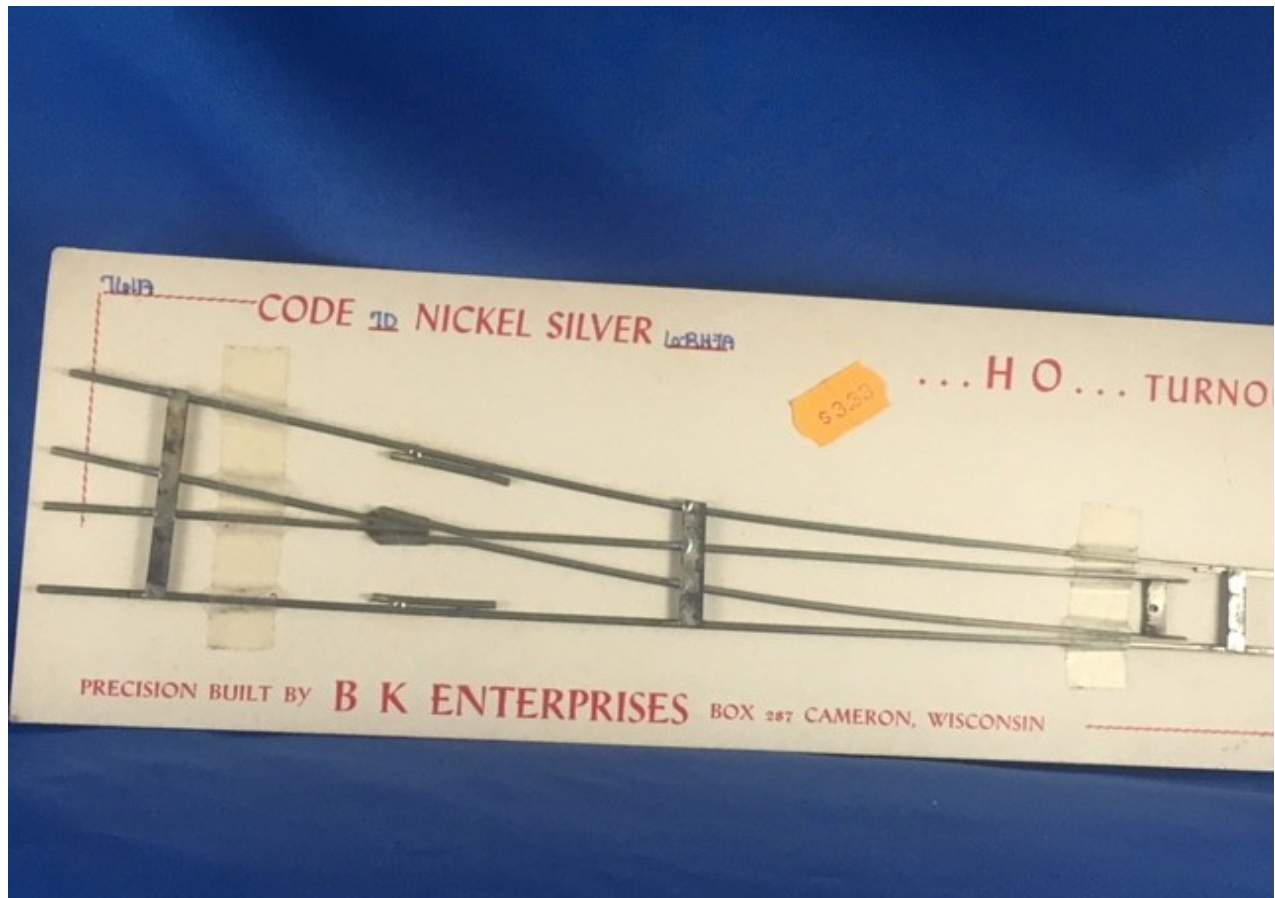
B-K HO turnout frogs are bent-rail (no casting) with a one-piece point-closure-frog wing rail structure (see Illustration [20](#) below). All B-K Enterprise turnouts require hand laying (i.e. spiking to wooden ties). Micro-Engineering (ME) nickel-silver (alloy C745) rail is utilized throughout and the point-closure rail assembly is one piece (i.e. no hinges). Frogs are rail soldered to a metal base plate so solderability is not an issue. User feedback is very positive and gauge dimension controls are reported to be excellent. The turnouts are not by definition DCC friendly due to the single metal crossbar at the points, but that is easily correctable either before or after installation. I have used #5 BK hand-laid turnouts in a yard ladder with good results. Availability is often a problem with these turnouts and they are a bit on the pricey side (>\$20 per). Wiring schema are available on Allan Gartner's "WiringforDCC" web-site.

B-K makes an extensive line of HO turnouts in Code 100, Code 83, and Code 70 rail. They are the only manufacturer offering #10-#16 left and right hand turnouts in Code 100 and Code 83 rail. See the Trout Creek Engineering web site for details.

### **Shimming**

I think that shimming is an extremely important action for trouble free track-work. Some of the “corrections” made by shimming are as follows:

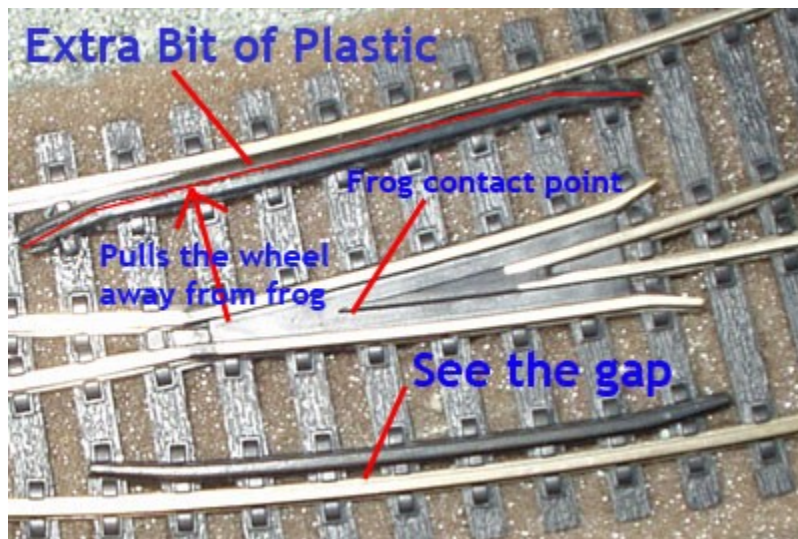
1. Reducing guard rail gaps to reduce frog picking on turnouts.
2. Eliminating side-to-side rock and roll (aka camber) on track.
3. Raising the level of frog “floors”.
4. Matching up adjacent track sections.



**Illustration 20: HO Code 70 B-K Enterprises Turnout**

Evergreen Scale Models manufactures a wide range of styrene strips and sheets that are available in most hobby shops. I find the 0.005" sheet very useful and it is not usually found in hobby store Evergreen displays. The 0.005" (thickness) dimensions is only available in sheet form. Nor, to my knowledge, does any other manufacturer of styrene sheet make 0.005" thick material...see Illustration 21 below.





**Illustration 21:**

**Styrene strips on frog guard rails-ref. New Rail Modelers**

### **Turnout Dimensional Analyses-Flangeways and Critical Clearances**

The data shown below in Table 1 are from NMRA specifications or measurements made with a digital micrometer not calibrated to any certified standard. It is clear, however, that frog and guard rail flangeway measurements vary significantly with manufacturer. Micro-Engineering has the tightest flangeways which is consistent with internet commentary, and Shinohara/Atlas have the widest...also consistent with internet commentary. PECO is in the middle of the NMRA flangeway specification for the frog flangeway and towards the high end for the guard rail flangeway.



<b>Manufacturer</b>	<b>Frog Flangeway</b>	<b>Points to Stock P</b>	<b>Closure to Stock</b>	<b>Guard Rail Flangeway</b>
NMRA spec.	0.035-0.050”	0.059-0.077	No specification	0.035-0.050
NMRA gauge Mark III	0.0385-0.0560	0.072”	Not Applicable	0.0385-0.0560
NMRA gauge Mark II	0.035-0.0535	Not Applicable	Not Applicable	0.0385-0.0560
Shinohara	0.048	0.178	0.148	0.54-0.56
PECO	0.043-0.044	0.129	Not Applicable	0.047-0.048
Atlas Customlines	0.049-0.050	0.099-0.120	Not Applicable	0.049-0.050 “
Micro Engineering new production	0.034-0.035	0.0625	Not Applicable	0.035”
BK Enterprises	0.043-0.045	0.169-0.171	Not Applicable	0.048-0.049 “

**Table I -Schematic and Table for Critical Flangeway and Clearances for Turnouts**

### **Summary Statement**

What I take away from my review is that all reviewed turnouts (PECO, Atlas, Shinohara, Micro Engineering, and BK-Enterprises) have a lot of satisfied customers. You should not be overly influenced by negative internet commentaries (see attached) as they are really outweighed by the positive comment. It is good to be forewarned about possible quality issues so that you can quickly determine if you have a problem which must be dealt with. All the above companies are reputable and will replace defective equipment FOC. But you shouldn't let the stuff sit in inventory for 20 years and then deal with the occasional quality issue. I haven't reviewed the Walthers-Shinohara turnouts since I feel they are really Shinohara equipment which is covered in the above review. You do have to be concerned about the W-S internal bus bar wiring which tends to be a little fragile. But with a little soldering savvy these W-S bus bar problems can be repaired. In short, every one of the above manufactured turnouts has its issues...none are show stoppers.

## Selected Internet Commentaries re HO Turnouts

posted by [Paul3](#) on Thursday, April 02, 2009 10:41 AM

At my club, we use **Shinohara** switches, and we deliberately remove those bronze point wipers. We find that they tend to short out when using a Tortoise machine to change the polarity of the frog unless the Tortoise is aligned perfectly. Since that doesn't always happen, we remove the wipers as a matter of course.

As for being DCC friendly, that they are not (tho' the Walthers new Code 83 line is DCC friendly). We found that as long as you stick with #8's or short wheelbase locos, you're normally fine. However, that has nothing to do with your issue about power to the rails past the frog. "DCC friendly" only refers to the points of a switch always being the same polarity as the adjacent stock rail. On Shinohara switches, since they have a metal throwbar, both points must change polarity every time they switch because they are the same polarity at all times. What can happen is when thrown, the back of a metal wheel rolling on the stock rail of the open point can contact the open point (which is the opposite polarity) causing a split second short circuit. This is normally not a problem with DC as their circuits are robust and don't need super-fast breakers to protect delicate circuits. DCC, OTOH, typically has breakers that trip in a 1/4 second or faster, and that makes the trains stop and jerk every time they make contact at the points.

What we do at our club is that we don't use rail joiners on the two frog rails of any Shinohara switch. We power each rail past the switch in the yard with feeder wires dropped to the bus. We drop one wire from the frog rails down to the internal contacts in the Tortoise, then route the power from the bus through the Tortoise as well. This powers the entire frog and point area, and we've had no problems at all with this method.

BTW, I'd rather have a short circuit than having my train run through the points reversed against me. That will most likely lead to derailments and possibly cars hitting the floor. Shorts are much better to deal with than that. 😊

Paul A. Cutler III

Posted by [cwclark](#) on Thursday, April 02, 2009 11:24 AM

The way your club wires the turnout is exactly how I wired my **Shinohara** turnouts using tortoise machine contacts and the inside rails past the frog insulated. Still there were numerous shorts when the train went thru them. I think the problem, as you stated, was a wheel touching the opposite point rail. The Shinohara turnouts I used were the curved variety and the wheel in the curve would inevitably touch the point rail too many times as it went thru the turnout for my liking. That is why I'm getting rid of the Shinohara turnouts. One slightly out of gauge wheel in the curve of the curved turnout is all it takes to make the short. The train could go thru the turnout 5 times without incident and then on the 6th time..POW!..there goes the short, the train stops, etc.

I replaced the Shinohara turnouts with # 6 Atlas turnouts after rearranging the cork roadbed a bit and there have been no more problems. It's just one of those things...if it's not 100% reliable, then I don't want it on my layout. There is nothing more embarrassing as having a group of people in the layout room and a train stops in the middle of a run by because something as trivial as a wheel touching

George T. Galyon



the opposite point rail makes a short. That could mark a guy for life during the home layout tour season....Chuck

**Posted by [Anonymous](#) on Wednesday, December 28, 2005 2:11 PM**

Hello.... I have a number of **Atlas Custom Line** turnouts on my layout,(code 100), and I have developed a method of making these turnouts much more acceptable to my nitpicking self.

#1) The frog of these turnouts is too deep and the point does not extend far enough into the frog. This causes wheel drop whenever a car or loco goes thru the turnout. Personally, I can't stand to listen to the racket as a car passes thru the frog. To fix this problem I use styrene strips. The width of the frog rail is .050. Using styrene strip which is .050 wide by .020 thick, I place one layer of strip on either side of the frog point. I use ACC to secure the plastic. When the glue has set, I take a jewelers flat file with grooves on the sides and run it thru the frog to even things out. I then take a second cut flat file and file the tops of the frog and surrounding rails. The frog is often higher than it's surrounding rails. Bringing everything to the same height,( to me anyway), is a no brainer!

#2) Next, I look at the area where the point rails join the stock rails. ( at the frog end). Very often there is a mismatch between the rails. If this mismatch is not too bad, I will simply put the point rail into the position I want and file the two rails together. I file this area until I have achieved a smooth transition from one rail to the next. If the rivet holding the point rail is too loose, I tighten it up before doing this step. This also makes the turnout feel more positive.

#3) Next, I look at the point rails where they adjoin the stock rails at the throwbar. Here, I just give the joint a bit of a file to make sure that it is a smooth transition.

#4) With all this filing, the rails are a bit rough to say the least. The last thing I do here is take a piece of 400 to 600 grit sandpaper, ( metalite if you can get it!), and I sand the turnout rails to smooth. This does not take that long and the result is shining rails. Contrary to prevailing opinion, I have not found this filing and sanding of the rails to contribute to the collection of dirt any faster than my non sanded rails. This may seem like a lot of work but after doing a few , it doesn't take that long! If you try this on a code 100 Atlas Customline turnout I think you will be shocked at how much better it is.

I started collecting these things when code 100 was where it's at! Code 83 was special order and to the moon for price. Personally, I don't care for snap switches and have stayed away from them. With Atlas, Customline is the only way to go! There is more but this has been long winded enough. I'll bet this is clear as mud. If you have more questions fire away and if I can answer, I will!!

**Posted by [ATLANTIC CENTRAL](#) on Sunday, August 27, 2017 2:52 PM**

OK, some facts:

**Atlas Custom Line** goes all the way back to the 1950's.I have an original 1957 copy of their track planning book which explains and lays out all the geometry of the #4, #6, wye, and the various crossings.

Mark IV is Custom Line. It is the 4th version of improvements that have been made.IIRC, improvements as follows:

all had plastic frog and stamped points, riveted pivot, and riveted to throw bar.

George T. Galyon

Mark II - isolated metal frog and "better" points, still pivoted on rivets

Mark III - Rivets gone at pivot, still riveted to throw bar, much better points

Mark IV - rivets gone, points clip into throwbar which is removable and reversible

There are some minor variations between the code 100 and code 83 product, I have not used the code 100 product in over 20 years.....

"Snap Track" is train set track, curved plastic frogs that equal 18" radius. It has co-existed with Custom Line as long as I can remember. I got into the hobby in 1968, was working in the hobby shop starting in 1971.....it was my job to know this stuff.....

The Atlas Custom line #4 is really a #4-1/2.....

The 18"R "Snap Switch" is about a #3-1/2.....

All Atlas turnouts have feed through jumpers under the frog.

All the metal frogs have lugs for adding power.

Sheldon

**Posted by [Allegheny2-6-6-6](#) on Saturday, May 29, 2010 4:30 PM - re Atlas Custom-Line Turnouts**

I purchased around 50 of them all code 83 from a hobby shop that was dropping their model railroad line, paid \$5.00/each so I couldn't pass the deal up. Listening to some of my model railroad buddy's who know all there is to know when it comes to all things trains I had planned on putting them on one of the message boards or an auction site to make a quick buck and put it towards Walthers/Shinohara's. I decided to use a pair of #6's I was pleasantly surprised at how nicely built they were and how well they worked. I have 6 of them left to use on the layout. Glad I didn't listen to someone who knew what they were talking about.

Note: Their only drawback if you want to call it that is that the frogs are made of what appears to be a white metal of pot metal which in it self is no big deal but if you want to power the frogs you can't solder to it. You need to tap threads into them and run a screw up from underneath, at least that how I do it.

12-28-2005, 10:08 AM [#1](#)

**[grande man](#)**

Bonafied Grande Nut

### ***Atlas Custom Line Turnout Tips***

Hi all. We had many "problem" turnouts on our RR and, since we use the common Atlas turnouts, I thought I'd pass along the "fix" we found. I've been an Atlas turnout user for many years (used them as a kid) and am not knocking their product. They are a good product at a good price. Plus, I love that "S" turn logo I remember as a kid...

George T. Galyon

We had derailment problems with several of our Code 83 and 100 turnouts. The problem seemed to be more persistent with the Code 83 turnouts and their related twin coil switch machines. Derailments in hidden staging are a real pain! After investigating the cause, here's the simple fix I found for them. In this "before" pic (illustrations 14-15) , you can see that the points have moved together in the switch rod. This causes the points to fail to make proper contact with the stock rails. No contact = derailments...



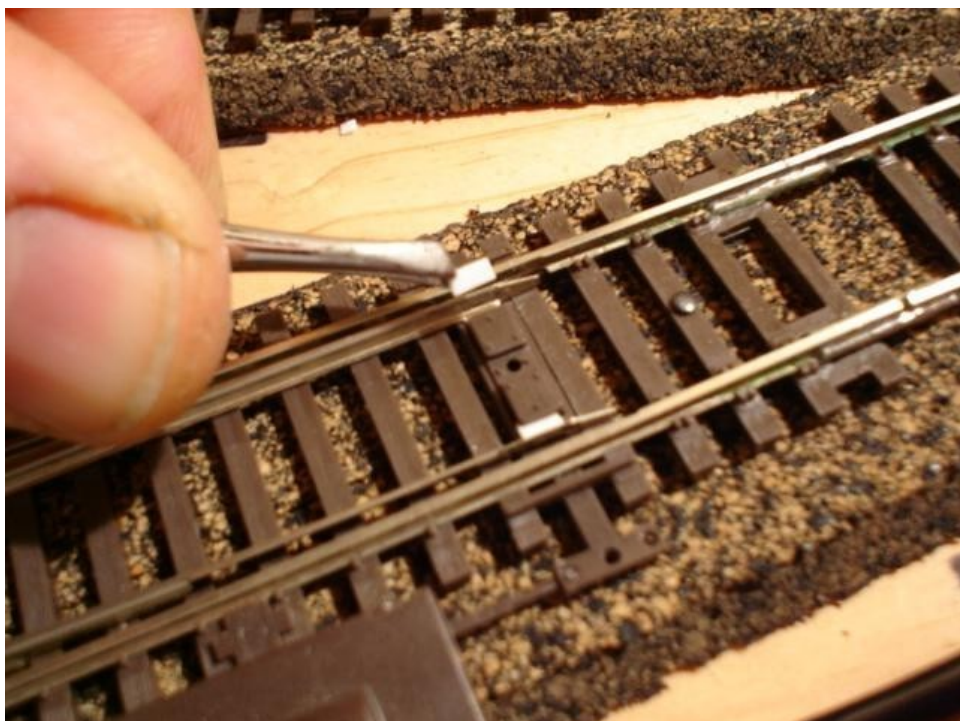
**Illustration 22: Atlas point rails - out of gauge (too narrow)**





**Illustration 23: Same as above-with NMRA gauge inserted**

Our fix, as stated above, is very simple. Using .012" sheet styrene (brass shim stock works too, but is harder to work with), cut appropriately sized shims to correct the point spacing. I don't bond ours in place because they slip under the switch rod's mount and stay securely put. Since the turnout pictured is in staging, I didn't bother to paint the shims. On scene shims can be easily hidden with a little paint..



**Illustration 24: Inserting Styrene Strips to adjust point rail spacing**



**Illustration 25: The NMRA gauge makes the improvement apparent**

### **Russ Bellinis *Active Member* -Atlas Custom Line Turnouts**

I would not buy Atlas turnouts, but that is strictly a personal preference. In the modular club we have a number of modules that have Atlas Custom Line turnouts installed on them that operate without any problems. The purpose of the flangeway is to keep the train from derailing as it goes through the turnout. Being a little tight is not as big a problem as being too loose, which would allow the wheels to drop off the track onto the ties. Have you used the gauge to check the wheel spacing on your Big Boy, reefer, and MP15ac? Also how much side to side "slop" is there when one of your problem pieces of rolling stock is parked on the turnout? We have had a few problems with Atlas Custom Line code 100 turnouts at the modular club with flangeways being too wide to work properly, even when the NMRA gauge fit. What members have done is glued a thin strip of .015 styrene to the inside of the flangeway to tighten them up slightly. Essentially, rolling stock tends to drop into the ties toward the movable points in the turnouts, so the flangeways are designed to hold the wheels close to the solid rail. You might push the reefer that has a problem through the turnout with another car as a handle so that your hand doesn't change the cars behavior on the turnout. As you push the reefer that has a problem through the turnout, what does the car do? I think it will do one of three things. If everything is ok, it will go through smoothly. If the flangeway is too loose, it may try to drop off the rails. If the flangeway is too tight, or too shallow, it may ride up above the rails either riding on the flange in the bottom of the flangeway, or because the tapered flange is squeezed by the flangeway causing it to ride up. If you can see exactly what is happening, then you have a better chance to fix the problem. Also while you push the car through, check it's behavior as it goes through the frog as well.

### **Re: Powering frogs on custom line turnouts**

□by **Russ Bellinis** » Apr 9th, '10, 12:07

Before you give up on soldering the frog, try Stay-Brite silver bearing solder and use Stay Clean flux with it. It is a soft solder with a little silver in the alloy, and I have found that it solders to a lot of materials that 50/50, 40/60, and 95/5 won't work with. It is probably a bit more expensive than the more common solders, and as far as I know, you won't find it at any big box home center. You probably need to get it at a welding supply store. The flux is a liquid about the consistency of water, so use a cheap paint brush to apply it. I used it in refrigeration work with copper pipes and use an acid brush to apply the flux, but for modeling, the acid brush would be too big. I would try the cheapest water color brushes you can get. The kind that would come in a child's water color set.

### **Powering frogs on custom line turnouts**

□by **Allegheny2-6-6-6** » Feb 14th, '10, 19:37

I have around 20 to 25 Atlas Custom Line turnouts already installed on the new layout I am currently building that I know realize most if not all of them will need to have the frogs powered. I was testing out a 2-10-2 that I had just installed a Tsunami sound decoder in last night and at prototypical yard speeds 5mph even the big loco stalled out when it hit the non powered frogs. So I think rather than go

George T. Galyon

the toggle switch route or power via the tortoise switch machines I am going to use Tam Valley Depot's Hex Frog Juicer, You can power up to six frogs with one board and you need to run a single wire from the frog to the HFJ controller.

My question is can I just drill hole through the roadbed etc. and feed a wire maybe a 22g through the small tab hole cast into the frog on the Atlas turnout and solder the wire to it or is there more involved?  
Thanks

### **Re: Powering frogs on Atlas custom line turnouts**

□by [Gary S](#) » Feb 14th, '10, 20:01

This is what I discovered when I was powering the frogs on my layout. using the same turn-outs as you:

First, I experimented with soldering directly to the frog.... doesn't work. The metal that the frog is cast from just won't accept solder. As I tried and tried, I put more and more heat, and of course, I melted the plastic and warped the turn-out, and the frog fell off.

So... my solution was to tap a 1-72 screw hole in the existing hole in the frog. Then run a brass screw through the hole and solder your wire to that. Yes, the screw head is visible from above, but some paint hides them nicely. Doing this before the turnouts are installed is a simple matter.

Now... concerning your situation. I did have a couple of the turn-outs installed before I realized I would need to put power to the frogs. I took a piece of "music wire" and snipped it off at an angle. I chucked that in a drill and then, starting at the top and using the frog hole as a guide, I drilled a pilot hole down through the layout. Then I took a 1/4" bit and drilled a hole from the bottom up to the frog. Now, be very careful when doing this, as you don't want to destroy the turnout with the 1/4" bit. Luckily, my layout is made from 1/4 plywood with 2" foam on top of that, so I was only drilling in foam when I got close to the turnout from underneath.

Next, I took 4" of scrap rail and filed one end down to a screwdriver tip. I soldered the rail in the screw slot of a 1-72 screw. Then I soldered a piece of feeder wire to the rail, about 1" from the screw. Then I used the rail as a screwdriver to run the screw up into the tapped hole in the frog. I did snug the screw up pretty tight by using pliers to turn the rail, but again, be cautious that you don't twist the frog out of the turnout. Then I snipped the rail off even with the bottom of the plywood, leaving just the wire coming out of the hole in the plywood.

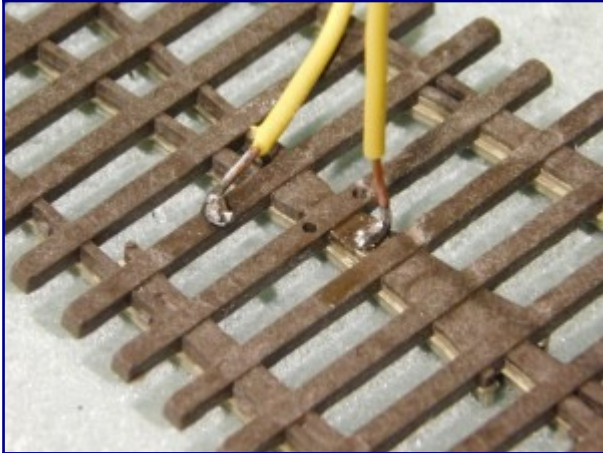
Adjustments to the details I give above will need to be made based on exactly how thick and what your bench work is made from...If you need, I can make some drawings or whatever if any of the above isn't clear. Just let me know. And, I hope this helps!

Even though you have quite a lot of turnouts to do, if you sit down at your workbench and make all of the screw/rail/wire assemblies at one time, I don't think it will be that difficult.

George T. Galyon



### March 13, 2017 DCC Guy -Adding Feeders to Micro Engineering Turnouts



Turnout with tinned feeder and installed feeder

One of the great things about Micro Engineering (ME) turnouts is they are DCC Friendly right out of the package. The points are isolated from one another with a plastic throw bar. The closure and stock rails are connected with small metal strips soldered between them. The frog rails are isolated as are the frogs. This all means that you are unlikely to get shorts if a derailment occurs. However it also means you must power the frog separately for reliable operations. This can be done with a circuit like a Frog Juicer or using the contacts on a switch machine. I opt for the latter and use Tortoise switch machines.

I also have a few Walthers turnouts on my layout which are also DCC Friendly. To power their frogs you have to solder a feeder to the side of the frog, which can be done before or after the turnout is installed. However, this also makes it more likely that you will melt or at least soften the plastic ties and spikes and deform the frog position. This is not the case with ME turnouts. The turnouts are made with an engineering acetyl plastic which seems a little less heat sensitive than on other turnouts and I have never had any problems when soldering. On the bottom of the bronze frog casting there is a small dimple cast in, through the plastic tie material. This is provided to allow owners to solder a wire feeder to the bottom of the turnout. The downside to this approach is it must be done before the turnout is installed. However, it also means that the feeder is completely hidden.

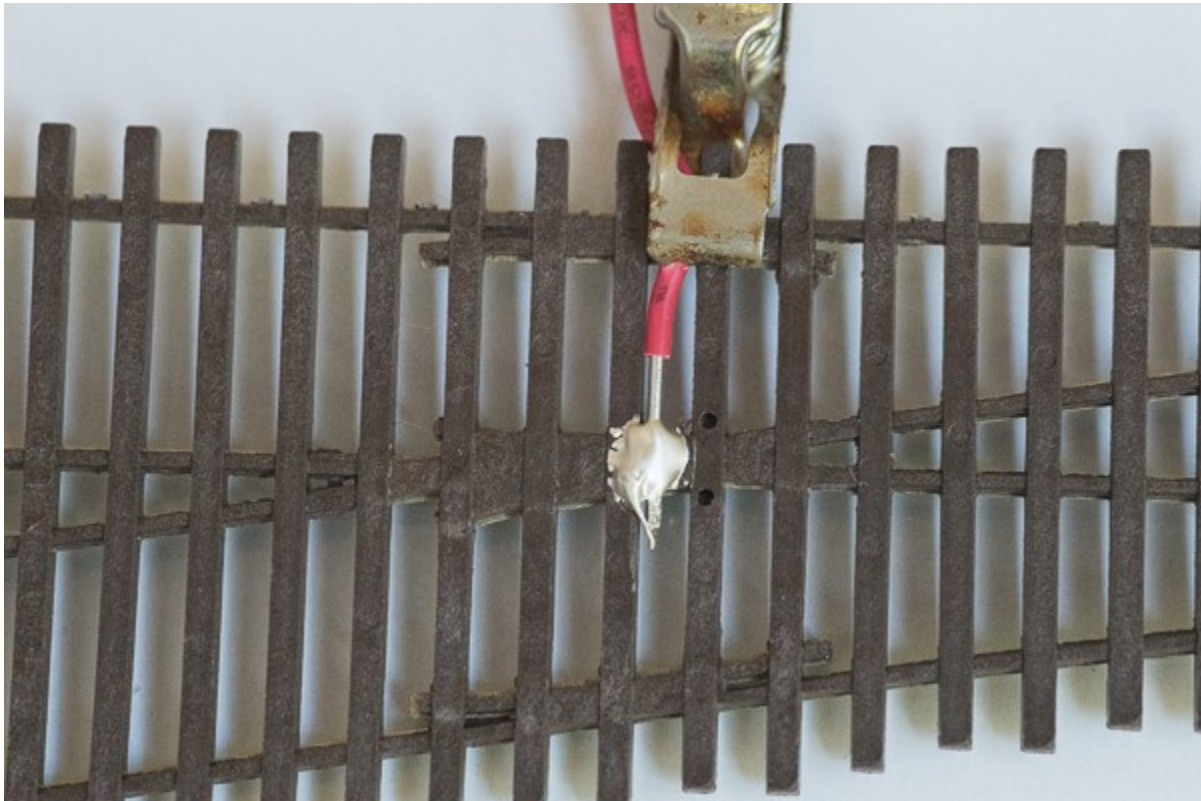
Installing the feeders is simple enough but requires good soldering skills. First, you need to mark the future location of the turnout on the roadbed. I do this by placing it in position and use a marker to make a dot on each side of the frog where the feeder will be attached. Afterwards I drill a hole halfway between the two dots.

With the feeder provided for, I file the dimple in the bottom of the bronze frog casting and apply a dab of paste resin flux. I then tin the spot by applying heat with my soldering iron until solder flows when touched to the bronze. Next I prepare a 9-12" length of solid copper 20 ga wire by stripping about 1/2" of insulation from one end. I make a small 90 degree angle on the bare tip using needle nose pliers—this only needs to be about 1/8". I then tin this and mate it to the tinned spot on the bottom of the frog—a touch of the soldering iron is all it usually takes for this final joint. I always flex the wire just to make sure that the joint is solid.

Once the feeder is attached I apply a thin line of Liquid Nails for Projects construction adhesive and spread it out with a plastic putty knife. Keep this layer very thin to avoid adhesive squeezing up between the ties. Finally I run the feeder wire down the hole I drilled earlier and slide the turnout into place. Using a wall paper seam roller I apply even pressure the length of the turnout. The final step will be to attach the feeder wire to the Tortoise.

### Conductive Epoxy

Do you need a solder-like connection but can't risk melting ties and knocking rails out of gauge? Are you trying to attach a wire to the frog of a turnout like a Micro-Engineering one? Conductive (silver-bearing) epoxy may be for you!



Conductive epoxy with clamp holding wire in place while it hardens. It even looks like solder!

Conductive epoxy has been around for years. I've never needed it until a friend told me he wanted to use Micro-Engineering turnouts. Micro-Engineering makes great looking turnouts with a cast frog. The challenge is attaching a wire to the frog without melting any ties and ruining its alignment. Time to try conductive epoxy!

You can order conductive epoxy from Amazon. The epoxy is made by Atom Adhesives.

[www.AtomAdhesives.com](http://www.AtomAdhesives.com). If you need any help, the Atoms Adhesives instructions say you can call them 24/7 at 888-522-6742.

We bought the 5 gram kit. It was \$11.99 plus shipping. We had six turnouts to do. As it was, we could probably have done 18; maybe more. There are larger and smaller kits available.

You can buy the epoxy in syringes. Our 5 gram kit came in a package similar to the convenience packages that restaurants use for ketchup and mustard. The package has two chambers - one with the epoxy resin and the other with the hardener.

You squeeze the package and break down the barrier between the two chambers. You then mix the two chambers together. When done mixing, clip a corner off the package and start dispensing your epoxy.

Before you start mixing your epoxy. Prep all your turnouts. We took a cutoff wheel and gently cleared the plastic off the back of the frog. (This will be evident if you are using Micro-Engineering turnouts.) We then prepped our wires. Strip both ends. For the end going to the frog, we used an alligator clamp to hold the wire in place. We found it necessary to put a small kink in the wire so that the clamp would apply a light pressure on the wire so that it would make contact with the frog. Get your turnouts ready and then mix your epoxy.

Of course, the big question is whether the epoxy conducts well enough to handle DCC power. How much silver is in it? So two tests were in order. One, is the famous "quarter test." Would a booster shut down if there was a short on the frog? So we tried that and it worked. But wait, recall that we fixtured up the wires with the clamps to press the wire against the frog. So maybe the epoxy didn't really work. So I conducted a second test. This was a simple ohm check across a dab of epoxy and a thin line of epoxy. Good, it only read about an ohm both times. Now I feel better that we have something that will work.

Conductive epoxy won't replace solder. Since it takes about 24 hours to cure, you will need to fixture your work for the duration. Fortunately, I had a number of alligator clips. But if I had more than six turnouts to do, even I would have run short on alligator clips. (Use medium or large alligator clips to get the jaws around the ties and rail.

If you tried to alligator clip wires to the sides of your rails, you don't want to get the clips in the epoxy or you may find the clips permanently afixed to your rail. Recall that our objective was avoid melting ties when used on a short frog. When you solder to a longer piece of rail, the danger of the heat knocking the rail out of gauge is less.

If you have a lot to do, buy several, smaller kits of the epoxy. You may want to buy an extra 2.5 gram kit in case you have to redo any joints. We apparently didn't get one of the wires epoxied properly and the wire came off. Now my friend is having to go buy a 2.5 gram kit for this one turnout.

As I mentioned, you can also buy this epoxy in syringes. One advantage of the syringe approach is that you only need to mix what you need and you will have some left over to use in the future. But there are advantages of being able to buy small packages that have a perfect mixture ratio of hardener and resin. So give it some thought and do what best suits your needs.

My friend is just now beginning his railroad and to string out his expenses, it will be some time before he power routes his frogs. So it will be a while before he knows if there are any issues with using the conductive epoxy. If you try it, let me know how it works for you.

**Re Atlas Frog power connection: cs.trains.com**

Posted by [zstripe](#) on Wednesday, December 30, 2015 12:46 PM

Guy,

A couple yrs. ago I was having a little trouble with a crossover...two #6 Atlas that went into a small yard, had a little bit of a stall at very low speeds with 4-axle switchers...so I needed to power both the frogs...they were already ballasted, so taking them out was not an option. I drilled a hole straight down the hole that is on the side of the frog from the top inserted a solid #26 copper insulated wire down the hole, stripped about a 1/4" of insulation from the end and made a 90 degree bend in it so when inserted in the hole the bend about 1/16 would rest on the outside of the hole and used the black 1-72 machine screw that used to come with the turnouts and was able to thread it right into the frog hole with the wire...just painted the head flat black and you would never know it was there. Just connected the wire to the relay that already was there for control panel lights and works like a charm. Since then, I have also done some #4's exactly the same way, they were also already ballasted. My layout is 1/2 ply + 1/2 Homasote for roadbed and yards.

Take Care! 😊

Frank

Feb 20, 2014 at 2:44pm

[Quote](#)



**Post by wp8thsub on Feb 20, 2014 at 2:44pm**

[Feb 20, 2014 at 2:20pm](#) @babalooley said:



[Feb 20, 2014 at 2:12pm](#) [riogrande](#) said:

Jim, whats horrible out the Atlas code 83? ...

The outside rail has a noticeable bend inward. Pick one up and look down the rail... The rivet on the points of the Atlas switch is also a problem at times. It can separate from the throw bar and once that happens the switch is finished.

I've had quite a bit better experience with Atlas 83. I got a deal I couldn't refuse on enough

George T. Galyon



Atlas 83 #6s to do my whole main yard, added some #8s I bought elsewhere, and mine work very smoothly.

The Atlas tie strip is molded with a bend of varying severity on nearly every code 83 turnout I've seen. Fortunately, the entire problem is between the frog and the heels of the points, and it's easy to cure. With the turnout upside down, use a cutoff wheel in a motor tool to remove plastic webbing between the ties from under alternate rails (i.e. cut under the straight route on one set, the diverging route on the next, and repeat), turning the problem area of the turnout into flex track. This takes less than a minute. Flip it over and you should be able to straighten it into perfect alignment.

The code 83 #6 and #8 don't have rivets for the points, but the electrical connection there can still fail. Soldering jumpers around it always cures the issue, but isn't common enough for me to do it to every turnout up front. I address this on an as-needed basis. I've never had a mechanical failure here.

Also, Atlas frog castings are frequently misaligned vertically, and occasionally are off horizontally. I use a mill file to get the top of the frog even with the surrounding rails, and a combination of a knife and jeweler's files to eliminate any casting flash around the frog. I also take the mill file to the tops of the points to ensure a smooth transition to the closure rails. This takes about as much time to describe as to actually do.

Tuned as described, Atlas code 83 turnouts perform about as well as any others, and probably better than some. I can move long cuts of cars through my yard ladders with nary a wiggle, and nothing derails.



Aesthetic compromises do enter into the equation, and the Atlas frog castings do look coarse even after weathering. Since the tops of guard rails and wing rails are not wear surfaces on the prototype like the running rails, you can paint any exposed metal to reduce visual impact. This especially helps on the #8s since the guard and wing rails are so long. I have since added this extra weathering to the turnout in the above photo and all others in the same yard.

Rob Spangler

**re ME Turnout enhancements**

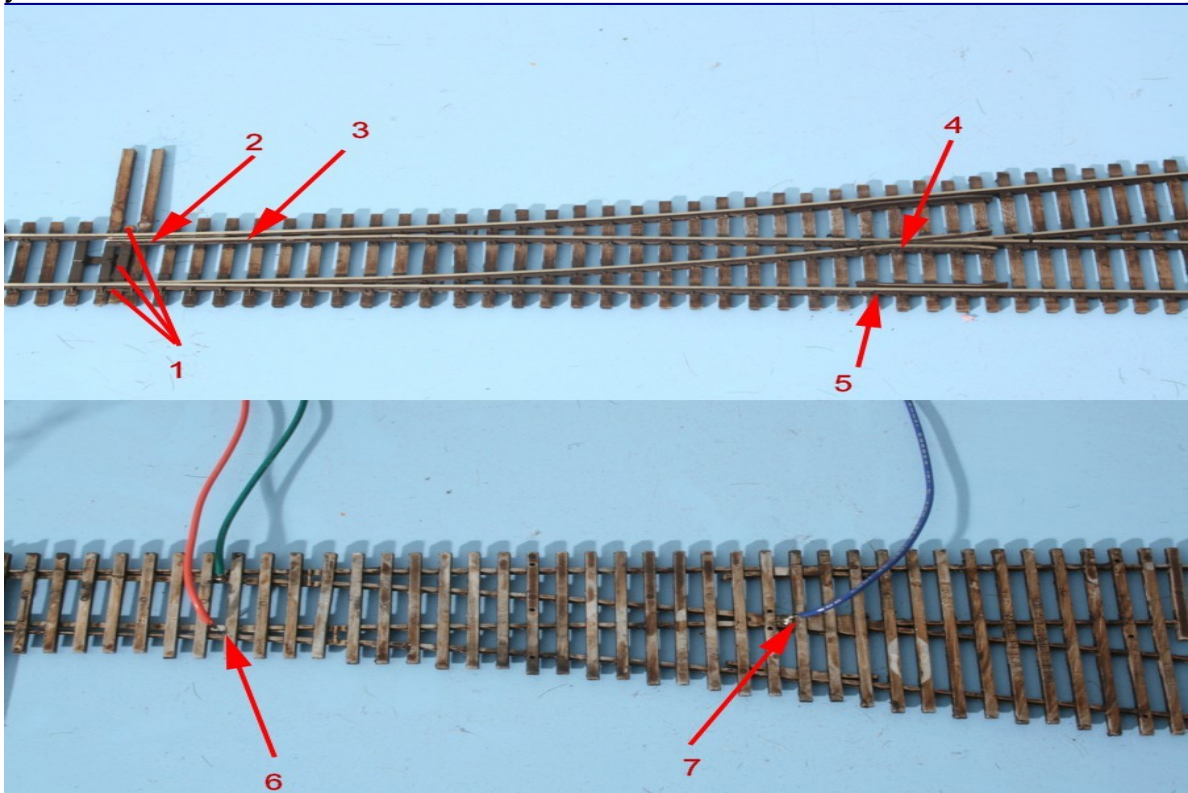
From Lancemindheimn.com-

My product of choice when it comes to turnouts are those from Micro Engineering. They are mechanically sound, highly detailed, and the points are spring loaded allowing them to be thrown with

George T. Galyon

a simple flip of the finger. As solid as they are, there are a few enhancements that make a good part even better.

1. Fill in the holes in the throw bar with modeler's putty
2. Sometimes the tip of the point has a slight curl to it. Use tweezers to gently bend the points straight so they sit tight against the stock rail. Give a few light passes with a file to the point tip to give it a more of a knife edge profile. This further reduces the risk that a wheel will pick the points.
3. Reinforcing bolt plate from Proto 87 Stores
4. Bolt plate from Micro Engineering (this comes with the turnout)
5. Joint bar from Details West (pn RB 933)
6. The points rely on mechanical connections to receive power. On occasion, dirt or oxidation will break the connection, the points go mechanically 'dead', and you may get some locomotive stalling. Carefully solder a stranded feeder to the heel of the points. Be careful not to get solder into the joint. When threading the feeder wire through the hole you drilled in the sub-roadbed, don't glue the ballast, leave it loose so as to allow enough flex in the wires that the points will still swing. Note that adding these feeders is purely optional as less than ten percent of your turnouts will have an issue where this is necessary.
7. Power tap to frog in case you want to feed power to it via a "Frog Juicer" or through a switch machine. You may not need this but it's easier to add the wire before installation than find out you need it after the fact.



**Illustration 26: Micro-Engineering Turnout Enhancements (see above)**

## ***Update on Atlas Frogs***

[June 3, 2015 DCC Guy](#)



OK folks, I hope you didn't rush out and buy a bunch of this stuff! I have been using Solder-It for over a decade, but today I tried to solder a feeder to an Atlas frog using a relatively new tube of Solder-It and now I can't get it to stick either. Holds great on the copper wire but dropped off the pot metal frog like it was glass. And yet I have another frog on the bench that I soldered a few years ago and it is still as tight as if it were a copper to brass joint. I did notice on the Solder-It website it says "Updated formula" which always is good for heart palpitations. So I guess whatever change they made also changed the range of pot metals that it will stick too, with Atlas' not being among them. So if you need to drop feeders off your Atlas frogs the only way I know of now is to thread a screw up through the hole in the frog casting and then solder the wire to the head of the screw. Atlas sells screws for this purpose and you may be able to find them at your local hobby shop. This method requires that you attach the feeder before installing the turnout, drill a hole for the feeder and then install the turnout. My problem is I already connected 8 Atlas turnouts in a ladder for my staging yard and that is going to be a royal pain to work with this way. Good luck with your installation.

### **Re: Soldering Frogs with Micro-Engineering Turnouts**

Date: 02/20/13 04:41

Author: [bigmc83](#)

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I've had no problem soldering to the frog on ME turnouts. I do not use the button on the bottom, but rather attach directly to the side of the frog. I try to attach it on the side facing away from the operator area, but on larger/island layouts that may not be possible. When painted, it hides the lead pretty well. Perhaps putting a damp cloth around the ties and area immediately outside of the button might reduce the change of melting ties?

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Date: 02/20/13 04:50

### **Re: Soldering Frogs with Micro Engineering Turnouts/Switches**

Author: [NSDTK](#)

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Make sure he's using low temp thin very thin solder. Using high temp or thick rolled solder can cause issues.

### **Soldering Atlas Ho Frog on #4, #6 and Y turnout**

Posted by [faraway](#) on Wednesday, July 15, 2009 12:25 PM

If got my first H0 Atlas turnouts for my new layout (I did use German rails and turnouts so far).

For smooth operation the frogs should be wired. Therefore I "try" to solder a cable. However I fail totally to do any soldering on the frogs. I make them clean, use an expensive soldering station and supply plenty of heat (up to 450°C) and power (max. 80W). The solder is the same one used for electronic soldering.

The frustrating thing is that all German US model railroad fellows have no problem to solder a wire to Atlas frogs.

I asked Atlas H0 support last night for advice. The reply was:

Atlas makes a special buss bar, which attaches to the frog, with a screw, and you attach a wire to the other end. The item nos. are #200002, for the buss bar, and #200001 for the Screw. These buss bars work on all HO #4, #6, and #8 turnouts.

I suspect Atlas did change the material the frogs are made of recently. My new frogs are not the same as the older frogs used by my German fellows.

The parts mentioned by Atlas support are not listed in their online catalog. They are not listed by German dealers. Are they known to you in the US and do you use them?

Finally did someone of you buy Atlas H0 turnouts recently that are out of the current production series. Could you solder the frogs easy?

Sorry, but I'm somewhat helpless. I did thousands of solder during my professional life and some more doing model railroading but this is a mystery to me.

**Posted 25 January 2010 - 17:37 by "Stephen" on**

**<http://www.rmweb.co.uk/community/index.php?/topic/8356-soldering-die-cast-metal/>**

Solderability of zinc die casting alloys

**Depends on the die-cast metal grade and type**, but assuming **Mazak, or Zamak, (zamac)**, then, *yes*, it will solder with ordinary tin lead solder, and an *acid flux*.

But, most people have really extreme difficulty getting it to work, because not enough heat is used, and not the right type of flux.

Because a relatively large casting is normally involved a really big capacity soldering iron is needed, not just high wattage, but high heat storage as well, in other words, lots of copper.

George T. Galyon

The items to be soldered must be ***totally clean***, and brushed with a stainless steel brush, to clean and mildly abrade it. It has to be super clean.

***The flux used has to be acid in action***, **Bakers fluid** will do it, or an acid with zinc added will do the job as a flux, (killed spirits). Most other fluxes are simply not active enough to work, and grease, rosin, and tallow based ones do not work. **C&L,(Carrs)** say that the **Grey Label** flux will work with mazak, and they recommend the 179 degree solder.

All Zinc based casting material has a tough oxide coating, and needs the acid, and heat to allow the alloy to be in good contact with the solder for it to bond properly.

Once tinned, the surfaces can be soldered together as usual. Sometimes difficult Mazak will take lower melting point solder as the tinning solder, and then normal solder to finish.

**Lead free solder** will also work, but the temperature needed is high, and approaching some of the cast melt temperature, so be very careful, do not apply a gas torch in the hope of reaching the temperature.

Lead free solder also bypasses any chance of corrosion from lead in contact with Zinc, but being on the surface solder does not cause Zinc rot etc, that is due to lead in the casting mix.

The one type of break in a casting that will not solder is a crystalline structure break, where the surface is broken crystal in appearance, really this should be filed away and the resulting larger crack filled with solder.

Some casting will not solder well, Hornby, Farish and older US makes like Varney, the Zamak was different.

Modern Chinese Zinc alloy seems to solder all right most of the time. Some castings are not Zamak and have more aluminum, and these are more difficult and may need specialist eutectic solders used. These are so called "flux free" and are applied at approx 400 degree, so very difficult to handle, as the casting may melt.

If the casting has been electroplated **black** or **chemically blackened** this may stop the soldering taking, it needs all filing away first, total removal near the joint.

Hope these notes help,

<div> <div>DESIGNATIONS: STANDARDS KEY</div> <div> <div>● ASTM B86</div> <div>● BS EN1774</div> <div>● EN1706</div> <div>● ASTM B94</div> </div> <div> <div>● EN12844</div> <div>● JIS5301</div> <div>● ASTM B85</div> </div> <div> <div>● BS1490</div> <div>● JIS5302</div> </div> <div> <div>● EN1753</div> <div>● JIS2222</div> </div> </div>				
	Equivalents			
	US	European	UK	Asia
Zinc	Zamak 2 ●	ZP2 ●	ZL2 ●	—
	Zamak 3 ●	ZP3 ●	ZL3 ●	ZDC2 ●
	Zamak 5 ●	ZP5 ●	ZL5 ●	ZDC1 ●
	Zamak 7 ●	—	ZL7 ●	—
	ZA8 ●	ZP8 ●	ZA8 ●	—
	ZA27 ●	ZP27 ●	ZA27 ●	—
	ACuZinc5 ●	—	—	—
Aluminum	A380 ●	46500 ●	LM24 ●	ADC10 ●
	383 ●	46000/46100 ●	LM2 ●	ADC12 ●
	390 ●	—	—	ADC14 ●
	A413 ●	44300 ●	LM20 ●	ADC1 ●
	413 ●	47100 ●	LM20 ●	ADC1 ●
	A360 ●	43400 ●	LM9 ●	ADC3 ●
Magnesium	AZ91D ●	MC21121 ●	—	MDI1D ●

Is there any SILVER in Nickel-Silver track that we use?

Posted by [grayfox1119](#) on Wednesday, September 21, 2005 6:22 PM

The composition of metals in the tracks that we use has "0" silver. The tracks are made of Copper, Nickel, and Zinc. It is Zinc that gives the tracks the "silver " appearance, hence the name Nickel-Silver. Although there can be several different percentages of the alloy mix, the most common is 65-18, or NS106. This means....65% copper, 18% nickel, and 17% zinc. The oxide that forms on this alloy IS CONDUCTIVE. However, it has a higher resistance to electrical current than "clean" surface, hence, keep your tracks clean.

The resistance of this alloy is 115 micro ohms /cm. A cm= 2.54 inches

Posted by [Homainline](#) on Sunday, April 22, 2018 8:25 PM -re Atlas Code 83 turnouts

I experienced a similar point rail problem with all seven of my not-all-that-old Atlas Snap Switch code 83 turnouts. After about only five years of light usage, all my locos began to derail and continued doing so - but only when *entering* the divergent route. The rolling stock never did because it never got to that point! However, *exiting* the diverging route was never a problem.

After measuring and re-measuring everything that could be measured, checking and re-checking all gauges, eye balling the turnouts and the locos' wheels (which bumped upward at precisely the same two locations on the point rails) at table top level, assuring flat surfaces, visiting with the local hobby shop, etc., etc., I finally called M.B. Klein, where I had purchased most of the turnouts.

The store (and presumably its customers too) had also experienced the same problem with an entire batch of Atlas Snap Switch turnouts, to the extent that it returned a whole bundle. The diagnosed cause - with which I agree - is that the point rails are so thin and flimsy (Chinese made these days, of course) that they gradually - and ultimately - bend outward when the locos and rolling stock cross them, leading to derailment nearly 100% of the time. You can easily see the difference between the sturdy build of the Peco and Shinohara point rails when compared to those of Atlas. No contest.

I wonder if the low-quality build and materials of your turnouts are somehow creating this problem for you. Or, it could be you simply got a bad batch. Klein can probably help you out here.

My solution: I went with Walthers Shinohara turnouts (yet to be installed).

Kerry

Posted by [hon30critter](#) on Monday, April 23, 2018 12:00 AM

ATLANTIC CENTRAL

It is possible for the points on an Atlas turnout to not be correctly seated in the throw bar. Again, pictures would help.

Sheldon makes a very good point. My club recently purchased about 60 Atlas Code 83 Customline #6 turnouts, and it was my job to tune them up. I found several where the point rails were not sitting properly on the throw bar. If you turn the turnout over so you can see the bottom of the throwbar you can see that there are tabs on the point rails with holes in them and these are supposed to sit on the fairly short pins on the throwbar. The tabs are easily displaced from the pins. That will allow the point rail to move out of position which can cause the problem that you are experiencing.

George T. Galyon



FYI, the pins are designed to allow the point rails to be disengaged from the throwbar fairly easily in order for the throwbar to be reversed. It's kind of a flimsy arrangement but apparently not too many people have problems with it.

While you are working on the turnouts, you might want to do a bit of a tuneup. On about half the turnouts I was working on, the tip of the point rails did not fit tightly against the stock rails. I had to bend the tips ever so slightly to close the gap. If the point rail tips do not fit tightly into the stock rails the wheels will 'pick' the point rails. In other words, they will catch on the tips of the point rails which may knock them off the rails. This is especially true of the leading trucks on steam engines.

While you are at it, check the tops of the point rails. I had a couple that had a tiny bit of flash that stuck up above the stock rails. Just another cause for derailments.

Another thing to check is the height of the frog. In almost all of the turnouts that I worked on the frog was higher than the frog rails (frog rails are the rails that lead up to the frog from the main and diverging routes). The difference in height will cause the wheels to bounce over the frog which, again, might cause derailments. Filing the frog down is simple, but be aware that the frog is easily dislodged from the turnout. Before starting to file the frog, make sure that there is absolutely no gap between the bottom of the frog and the turnout (use a magnifying glass). If there is any gap use some liquid CA (not gel) and clamp the frog tightly to the turnout while the CA sets.

Also, if you are going to solder a wire to the frog, be aware that excess heat can cause the frog to come loose. You must remove the colouring from the frog before attempting to solder anything to it. A better solution is to tap the hole in the frog for a brass 2-56 x 1/8" screw or bolt and then solder the frog feeder to the screw. I was able to solder the brass screws in place but the Atlas frogs really don't like to accept solder.

There is also a method of making sure that the point rails will never lose power due to oxidization or dirt fouling the contacts. It involves adding jumpers between the point rails and the closure rails, and between the closure rails and the stock rails. I won't go into the details here, but if you are planning on running two axle switchers or older locomotives where not all wheels pick up power, you may want to read this:

<http://www.wiringfordcc.com/switches.htm>

After all that you may wonder if the Atlas turnouts are faulty right out of the box. They are not. They will probably work fine without doing anything to them, but they can be made to work better with a little tuning.

Dave

Posted by [ATLANTIC CENTRAL](#) on Monday, April 23, 2018 4:31 PM  
HOmainline

I even glued (with CA) those flimsy point rails in the throwbars once they began coming loose each time the turnout was engaged. Didn't do any good in eliminating derailments.

Really? I could have told you in advance that would turn out badly.

The points need to pivot as the throw bar moves.

Defects do happen, and sometimes they happen to whole batch of product.

But I have operated hundreds of hours on numerous layouts built with hundreds of ATLAS Custom Line code 83 turnouts without any of these failures described here.

One guy I know, in total defiance to even my own comments above, has operated his layout without switch machines or ground throws on his ATLAS #6 turnouts for nearly 20 years now.

OK, 20 years ago was a different production run, maybe a different factory in China, but they work fine.....

Sheldon